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PRIORITIZATION OF MEDICAL COMBAT DEFICIENCIES: APPLICATION OF THE ITERATIVE DECISION METHOD

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Abstract (Continue on reverse side if necessary)

The objectives of this research were to develop and apply systematic and reliable procedures for the prioritization of lists of medical combat service support deficiencies as a part of the mission area analysis program. Two 7-member panels of Army Medical Department experts were employed to prioritize over 60 specific deficiencies within 8 major areas. Panels were made up of the AHS Force Integration Committee and an AMEDD General Officer Board. Decision making was accomplished with the Iterative Decision Method, a group productivity technique designed to maximize the effectiveness and efficiency of decision making by an expert board of 5 or 7 members. Levels of prediction, reliability, item dispersion, and patterns of item priorities between expert panels were found to be highly similar. Final priorities for major areas included (1) Casualty Care and Treatment, (2) Casualty Prevention, (3) Medical Resources, (4) Evacuation, (5) Chemical Warfare, (6) Command & Control, (7) Biological, and (8) Nuclear areas.

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Executive Summary

Purpose

The objectives of this research were to develop and apply systematic and reliable procedures 1) to identify and describe major and specific subarea medical combat service support deficiences, 2) to prioritize subareas within each major mission area, 3) to prioritize the major mission areas, and 4) to provide the Army Mission Area Analysis (MAA) Program with an Army Medical Department (AMEDD) submission of medical combat deficiencies and proposed corrective actions for input to the Training and Doctrine Command (TRADOC) and the Department of the Army (DA) MAA planning and budgeting cycle.

Approach

Medical combat service support capabilites and deficiences were identified through the use of a computer simulated war game scenario (Europe III - Sequence 2 Alpha). The exercise assessed the 1986 US force structure against the 1992 Soviet Warsaw pact threat in the theater of combat operations. Initially 68 subarea deficiencies within 13 medical functional areas were identified through front-end-analysis and corrective actions were specified. Due to limited budgetary and technological resources, not all areas can or will be funded or developed. Therefore, it was critical to identify the top medical combat priorities.

Two 7-member panels of experts with over 300 years of collective military medical experience were employed to prioritize the major and subarea deficiency lists. The first panel consisted of six colonels and one lieutenant colonel who comprised the Force Integration Committee (FIC) of the Academy of Health Sciences, Ft Sam Houston, TX. The second panel, the AMEDD General Officer Board, consisted of five general officers and two senior colonels representative of major AMEDD organizations.

The Iterative Decision Method (IDM) developed for this project is a group productivity technique designed to maximize the effectiveness and efficiency of decision making by an expert board of 5 or 7 members. The procedure consisted of a nominal group phase in which members rendered independent expert priority judgments (J1) of deficiency items. The J1 decisions were statistically modeled using multiple linear regression equations. Feedback results that identified item priorities and areas of disagreement were presented to panel members. Experts then made revised group judgments (J2) based upon the interpretation of the J1 results. Revised results from the FIC group prioritization decisions (J2) served as input to the General Officer Board judgments (J1).

Results

Levels of prediction, inter-rater reliability, item dispersion, and patterns of specific item priorities between the two expert panels were found to be highly similar. In addition, the experts indicated that the results were accurate, that the process utilized their expertise, and that they were confident in, and satisfied with the obtained results.

Final item rank priorities (J2) from the AMEDD General Officer Board were rescaled to 0-1.0 values and were submitted with the MAA results to the Logistics Center, Ft Lee Virginia, to be incorporated into the combat service support MAA for submission to TRADOC and DA. The final prioritized list of medical combat deficiencies included: (1) Casualty Care and Treatment, (2) Casualty Prevention, (3) Medical Resources, (4) Casualty Evacuation, (5) Prevention and Medical Treatment in Chemical Warfare, (6) Medical Command, Control, and Communication/Intelligence, (7) Prevention and Medical Treatment in Biological Warfare, and (8) Prevention and Medical Treatment in Nuclear Warfare.

Specific results for the three most important deficiency areas are outlined below. The top five ranked items are listed for each area. Casualty Care and Treatment items included 1) resuscitation capabilities, 2) medical and surgical capabilities, 3) self and buddy aid, 4) treatment regimes for directed energy injuries, and 5) diagnosis and treatment of combat stress reactions. Casualty Prevention items, ranked by importance were 1) eye protection from high velocity fragments and high intensity electromagnetic radiation, 2) detection, identification, and early warning of disease, 3) recognition, monitoring, and correction of health hazards to crews and friendly forces, 4) doctrine and training for the prevention of combat stress, and 5) environmental protection for patients in evacuation. Of 28 items within Medical Resources, the top five included 1) combat zone and communications zone (COMMZ) medical treatment facilities, 2) COMMZ hospital augmentation and reconstitution of corps level treatment facilities, 3) medical resupply support, 4) clinical laboratory capacity, and 5) medical materiel, supply, and equipment decontaminants.

The top ranked items for the remaining deficiency areas were: air and ground vehicles within Casualty Evacuation, chemical prophylaxis, antidotes, and theraputics for Prevention and Treatment in Chemical Warfare, major systems (PLRS/JTIDS Hybrid, SINCGARS, IHFR, etc.) within Medical Command, Control, and Communication / Intelligence, detection equipment to identify biological contamination within Prevention and Medical Treatment in Biological Warfare, and radiological prophylaxis, antidotes, and theraputic compounds within the Prevention and Medical Treatment in Nuclear Warfare area.

Mission Impact

Implications of the prioritization results for management and training decisions are discussed. Considerations are based upon both the major combat service support areas and the prioritized subareas within each major area. Potential uses of the IDM process are also explored.

In all, the project modeled over 2,000 expert decisions and constitutes a defensible and comprehensive basis for the priority of US Army medical combat service support deficiencies and required corrective actions.

PREFACE

This research was conducted jointly by the Concepts Division (CDC) of the Directorate of Combat Developments (DCD) and the Individual Training Division (ITD) of the Directorate of Training Development (DTD), at the Academy of Health Sciences (AHS), Ft. Sam Houston, Tx. The completion of this project would not have been possible without the cooperation, dedication, and support of the many individuals involved in this effort.

Recognition is extended to COL Helmer Thompson, former Director of DCD and his Mission Area Analysis (MAA) staff, COL Francis McKeever (present Director of DCD), LTC Joe Burt, MAJ Paul Hatkoff, and MAJ William Thornton for their guidance, direction, and participation during the development and implementation of the decision-making method documented in this monograph. Appreciation is expressed to COL Raymond Leahey, Director of DTD, Senior DTD Education Specialist Evelyn Revels, LTC James Laible, Chief of the Individual Training Division, and LTC John Sullivan, Chief of the Enlisted Development Branch for their support, suggestions, and encouragement during the course of this project. Thanks are due to Dr. Henry Lippert and SFC Dimas Espinoza of the AHS Learning Resources Laboratory for their advice and for providing the computer access needed for data analysis and the development of the Iterative Decision Method (IDM) APL (A Programming Language) computer program library.

The author is indebted to Dr. Guy Manaster, Dr. Ben Fruchter, and Dr. Earl Jennings of the Department of Educational Psychology at the University of Texas at Austin and Dr. Joe Ward, Jr., and Dr. Robert Bottenberg of the Air Force Human Resources Laboratory at Brooks Air Force Base, Tx, for their useful critiques, insights, and evaluations regarding earlier versions of the statistical fixed-X linear models that have evolved into the multiple coded-vector regression analyses and the squared residual analyses central to the IDM process.

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MAA deficiency items and corrective actions were developed by CDC, DCD. Principal investigator for the decision-modeling phase of this research was Dr. Kenn Finstuen. The final manuscript was typed by Kris Thompson.

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Prioritization of Medical Combat Deficiencies:
Application of the Iterative Decision Method

INTRODUCTION

The United States Army Medical Department (AMEDD) is faced with crucial financial, managerial, and technological decisions pertaining to short- and long-term medical combat requirements. Medical research, development, and training priorities set today will impact the Army's state-of-the-medical-art and combat performance in the year 2000. Through the identification and prioritization of deficiencies, specific medical programs may be targeted and corrective actions may be taken in order to deliver the appropriate medical and health care services on future battlefields.

The purpose of this study was to develop and apply systematic and reliable procedures 1) to identify and describe major area and specific subarea medical combat deficiencies, 2) to prioritize subareas within each of the major medical combat deficiency areas, 3) to prioritize the major deficiency areas, and 4) to provide the Army Mission Area Analysis (MAA) Program with an AMEDD submission of medical deficiencies and proposed corrective actions.

Mission Area Analysis

The Army MAA Program is an integral part of the DOD MAA program and consists of an ongoing examination of specific mission elements 1) to determine deficiencies related to operations concepts, tactics, organization, training, and materiel systems, 2) to propose feasible solutions to correct deficiencies, 3) to identify opportunities for capitalizing on advances in technology, and 4) to provide a set of prioritized mission requirements for use in evaluating present systems and developing future systems.

The Army Training and Doctrine Command (TRADOC) is responsible for conducting analyses of US Army missions for air defense, light and heavy close combat, fire support, communications, and combat support for engineering, mine warfare, nuclear-biological-chemical (NBC) warfare, and support services. Analysis of the combat service support mission area falls under the authority of the Army Logistics Center at Ft Lee, Virginia, and consists of projects related to capabilities for supply, maintenance, field services, transportation, personnel and administration, communications, and medical support. This particular study documents the MAA activities directed to medical combat service support deficiencies and was conducted by the Directorate of Combat Development and Health Care Studies at the Academy of Health Sciences, Ft Sam Houston, Texas.

Medical combat service support capabilities and deficiencies were identified through the use of SCORES (Scenario Oriented Recurring Evaluation System), a computer simulated war game technique. Scenario results provided predictions of medical support requirements, i.e., number of beds, staffing, types and frequency of medical treatment, supplies, etc. Requirements were computed from various combinations of casualty rates, types of wounds, troop strength, weapons employed, and terrain and environmental conditions.

Medical support requirements were then matched against projected available medical resources to isolate areas of adequate versus deficient coverage. Forecasts were made based upon historical battlefield trends and medical statistics from World Wars I and II and the Korean and Vietnam conflicts (e.g., Neel, 1973: Reister, 1973). The particular scenario employed for this project involved threat reactions and responses of the US Army 5th and 7th Corps medical units and other medical units which would be deployed in the European theater of operations under conventional, chemical, and nuclear warfare conditions. The scenario used, Europe III-Sequence 2 Alpha, was run in a 1986-1992 time frame which assessed the 1986 US force structure against the 1992 Soviet Warsaw pact threat. Major deficiencies identified through this procedure included areas impacting upon medical and surgical treatment; force structure; logistics; evacuation and regulation; optical, dental, and veterinary services; preventive medicine; communications; blood bank services, and NBC. Individual subarea deficiencies were further specified, refined, and analyzed by medical subject-matter-expert panels composed of consultants from the Office of The Surgeon General, personnel from the Medical Research and Development Command, AHS instructors, and medical personnel assigned to Brooke Army Medical Center, Ft Sam Houston, Texas. (See Appendix I for a complete list of the initial major and subarea deficiency items.)

Once the major and subarea medical combat deficiencies were identified, the next step in the project was to select an appropriate decision-making method to prioritize the deficiency lists. The following section outlines the requirements and rationale used for the selection of a systematic and reliable decision-making method.

Alternative Approaches to Decision Making

Group versus individual decisions. Decision-making actions may be viewed as a form of productivity. Within a productivity approach, judgments can be assessed along the dimensions of effectiveness and efficiency. To be effective, decisions should be accurate, be centered upon appropriate issues, be understandable, and be useful as an integrated product. To be efficient, decision-making actions should be timely, be arrived at in an orderly, systematic manner, and be parsimonious in the expenditure of resources.

Outputs from small groups have typically been found to exceed outputs of single individuals (Baron, Byrne, & Griffitt, 1974; Middlebrook, 1974; Rosenberg, 1969). An extensive literature review of small group and individual productivity from 1920 to 1957 (Lorge, Fox, Davitz & Brenner, 1958) presented evidence in favor of group versus individual performance across a variety of performance tasks. For example, groups were shown to be more accurate than individuals in judgments of the weight of physical objects (Bruce, 1935), in the detection of small words within large words (Watson, 1928), in judgments of social situations (Eysenck, 1939), and in the solution of other complex problems (Shaw, 1932). More recently, Davis (1969) demonstrated that cognitive and intellectual task performance may be enhanced by group activity.

In terms of efficiency, however, some research has shown that an individual may be more productive in organizing activities if action requires a high degree of coordination in a short period of time (Kelley & Thibaut, 1969).

The practice of collective decision making has long been recognized by the military as evidenced by numerous boards for personnel selecion, promotion, and disciplinary actions. In addition, boards are routinely convened for the selection and prioritization of tasks for training, for budget and funding actions, and for mission and program planning functions.

Nominal versus interactive group decisions. Although group decisions tend to be superior to individual decisions in terms of productivity, different approaches may be taken to arrive at a group decision. Are members of a board more effective and efficient in decision making if they work individually or if they accomplish most of the work in face-to-face meetings? This question addresses the difference between nominal and interactive group structures. For example, a decision-making task could consist of the selection of four out of ten eligible candidates for promotion. In the nominal group mode board members make their selections independently and record their choices. When the board is convened, the individual lists are combined and reviewed. Those candidates which most frequently appear on the lists are then recommended for promotion. In the interactive group mode, board members meet and formulate their ordered choices based upon discussion and mutual information exchange. The end product in each case is a prioritized list of primary and alternate candidates which reflects a collective board decision.

Comparative research studies of decision making in small groups suggest that there are different distinct advantages associated with the use of nominal versus interactive groups (Marquart, 1955; Taylor, 1954). Differences in performance may be attributable to three main factors, viz, the nature of and difficulty associated with the objects that are judged, characteristics of the group members who make the judgments, and the situation in which the judgments are rendered.

In reference to judgmental difficulty, both groups tend to function equally well for simple unitary task decisions (Kelley & Thibaut, 1969). As decisions become more complex, interactive groups tend to perform more accurately and tend to be more satisfied with their performance. For example, in an experiment by Faust (1959), both nominal and interactive groups attempted to solve a series of simple spatial problems. Solutions of the two groups were very similar. However, for complex verbal problems that involved scrambled words, the interactive group performed significantly better than did the members of the nominal group.

Morris (1966) studied task difficulty effects in relation to production, discussion, and problem-solving tasks. Three hundred and twenty-four undergraduates rated 27 standard tasks, nine for each task type. Subjects were then divided into 108 three-person groups and interacted in the accomplishment of the tasks. Interaction was assessed by a Bale's interaction analysis system. Correlations between the subjects' difficulty ratings and facets of the group interaction process showed that difficult

tasks were associated with more structuring of answers, seeking evaluation from others, and significantly less irrelevant activity which may be viewed as more efficient performance.

Hackman (1968) has also shown that characteristics of task difficulty and task type (production, discussion, and problem solving) influence the nature of group performance. In this study, members participated in tasks at low, medium, and high levels of difficulty. Hackman found that written products from more difficult tasks tended to be more original and issue-involved while products from the easier tasks proved to be less original or issue-involved but of higher grammatical and rhetorical quality.

Shiftlett (1972) incorporated both interpersonal interaction and task difficulty variables in a study addressed to task performance and member satisfaction. Group members worked on both easy and difficult crossword puzzles under three interaction strategies consisting of autonomous labor-nominal group, divided labor (one person solved horizontal words while the other person solved vertical words of the same puzzle), and shared labor (both subjects of a dyad solved the puzzle by mutual agreement). Dependent measures consisted of the correct number of words solved, perceived difficulty, and attitudes toward the task. Performance scores and difficulty ratings for the easy tasks were significantly different from scores and ratings for hard tasks. Performance main effects revealed that the highest performance occurred in the shared labor strategy followed by divided labor and individual effort. The same pattern was repeated for the member satisfaction attitudes.

In a recent review, Hackman and Morris (1975) stressed the importance that moderating effects of the group interaction process and task characteristics have upon satisfaction and performance outcomes.

Numerous studies have investigated the moderating effects of task difficulty and interpersonal interaction upon performance and consequent satisfaction and arrived at similar findings (Trow, 1957; Ewen, 1973; and Bray, Kerr, & Atkin, 1978).

Three central concerns separate the nominal from the interactive process in regard to the characteristics of group members. First, a nominal group maintains a higher degree of impartiality because members make their decisions individually. Independent action limits the amount of influence that board members may exert upon others (Van de Ven & Delbecq, 1971; cf. Torrance, 1957). Second, by discussion, members tend to stimulate thoughts that other members might not have if they work alone (Hall, Mouton, & Blake, 1963; Jones & Geraud, 1967). Third, an interactive group benefits from a pooling of immediate resources while the nominal group does not. In terms of accuracy, face-to-face interaction provides opportunities for errors to correct themselves, for clarification of issues, and for the analysis of the logic behind member decisions (Delbecq, Van de Ven, & Gustafson, 1975). Numerous studies have examined the pooling-of-abilities, skills, and knowledges issue (Goldman, 1965, 1966; Goldman, McGlynn, & Toledo, 1967; Johnson & Torcivia, 1967; Laughlin & Johnson, 1966; Lorge & Solomon, 1955; Shaw, 1971; and Steiner, 1966, 1972). While the majority of these studies confirmed the obvious advantages of the pooling-of-abilities effect on

decision making in interactive groups, findings also indicated that the effect was contingent on a high level of member ability. In groups composed of experts, each member has unique specialized information, skills, and experiences that enhance collective decision making. In interactive groups composed of individuals with relatively low ability or knowledge of the issues, few, if any, gains were observed beyond the productivity of nominal group conditions.

In regard to situational effects upon the productivity of decision-making actions, the amount of time allowed for solutions appears to be one of the major factors affecting both interactive and nominal group conditions (Davis & Restle, 1963; Restle & Davis, 1962; Restle, 1962). Not surprisingly, solution times have been found to be greater as the complexity of problems increases (Lovelace & Snodgrass, 1971; Moyer & Landauer, 1967; Parkman, 1971; and Potts, 1974).

Optimal group size. Another situational factor primarily related to interactive group productivity involves the size of the decision-making group. Steiner (1966, 1972) hypothesized that productivity generally increases with the size of the group up to a point where coordination and motivation decrements take over. Group interaction affects performance and consequent satisfaction by producing coordination decrements in the efforts of individual group members and by producing motivation decrements in the level of effort group members will exert on a group task. In the case of coordination effects, the larger the group, the greater will be the process loss due to the requirement of all members functioning in a concerted manner. For motivation effects, member effort is generally expected to decline as group size increases since adding more persons to the group decreases the individual amounts of any outcome reward associated with the task.

Support for these factors has been found for several types of performance measures. For instance, Ziller (1957) found that decision accuracy increased 74% when the performance of one person was compared with the performance of a 3-person group. However, increments in productivity tended to be smaller as more people were added to the group, i.e., when the group was increased from three to six members, accuracy increased only nine percentage points. In a more recent study, Ingham, Levinger, Graves and Peckham (1974) conducted a replication of the classical Ringelmann effect which shows that performance decreases as group size increases in a tug-of-war (rope pulling) task. Subjects were 102 male students assigned to groups ranging from one to six members. Performance scores, as recorded by an electronic rope strain gauge, dropped significantly as group size was increased from one individual to two or three, but leveled off with the addition of a fourth, fifth, or sixth team member. The investigators interpreted the finding, that increases in group size are inversely related to individual performance, as general support for Steiner's coordination-decrement and motivation-decrement hypotheses.

Several other studies have investigated coordination decrements associated with increased group size. James (1951) reported that members experienced difficulty in coordinating groups of more than seven persons. Delbecq et al (1975) have also shown that as size increases above some limit

(about size seven) that restraints against participation increase. Middlebrook (1974) states that "in groups of more than eight or 10, maintaining contact with others in the group may be highly difficult." Finally, in a study by Hare (1962) it was found that as groups were increased from five to 12 members, the amount of consensus that resulted from group discussion decreased.

In addition to the mechanics of coordination, motivation is inversely affected by increases in the size of interactive groups. Both Shaw (1960) and Thelen (1949) found that motivation and levels of involvement were higher in two to five member groups than in six to eight member groups. A study by Slater (1958) employed groups of from two to seven members. Results indicated that groups of size five were most satisfied with committee size. Larger groups complained of inefficiency, while smaller groups became more concerned with interpersonal relations. These findings were affirmed in studies by Hare (1952, 1962) where five-person groups reported more satisfaction with discussion than did 12-member groups. Hare concluded that in groups of less than five members, persons felt the group was too small although the amount of available discussion time per member was increased. Above size five, members tended to feel that participation was restricted.

With respect to the optimal size for interactive discussion groups, several investigators recommend a size of five (Bales, 1954; Slater, 1958; Hare, 1962), while others recommend a range from at least five to seven members (Delbecq et al, 1975; James 1951; and Van de Ven, 1974). Groups of less than five participants probably lack the diversity of skills under the pooling-of-abilities model in terms of the total number of critical judgments required for an accurate group decision. Also, in groups of five or more it has been found that the opinions given are generally more carefully thought out before they are presented (Hare, 1962). These findings indicate that, for optimal productivity, interactive decision-making groups should consist of at least five but no more than seven members. Further, the use of an odd number of members is recommended to circumvent the possibility of a deadlock. An additional advantage of five or seven member groups is that when disagreements do occur, the majority and minority positions are usually quite similar in size, i.e., three versus two or four versus three, and are not perceived as radical departures from the group position (Hare, 1962).

In summary, the evidence from the research literature indicates 1) that collective discussions are more productive than decisions made by a single individual, 2) that nominal group structures are most useful for making unitary task decisions and for maintaining impartiality, and 3) that interactive groups of five or seven experts are most productive for making complex decisions when pooling-of-abilities is required and tend to be more satisfying.

Maximizing decision productivity for boards of experts. Many special purpose techniques exist for modeling expert judgments and decision-making actions. These approaches may be loosely classified into four major categories. The first category consists of basic prioritization models and deals with ranking (e.g., Q-sort and the method of paired comparisons) and

scaled ratings of stimuli (Kerlinger, 1972). The second major category is concerned with the generation of decision alternatives and choice models such as the Delphi survey technique (Turoff, 1970), the nominal group technique--NGT (Delbecq et al., 1975; Van Dusseldorf, 1971; Vroman & Watson, 1974; and Vroman, 1975), and the training front-end-analysis--FEA method (Harless, 1975). A third category consists of policy-capturing and judgment analysis models based largely upon multiple linear regression techniques (Christal, 1968, a, b; Hoffman, 1960). The last general category deals with mathematical models based on subjective expected utility (SEU), decision optimization, and valence-instrumentality-expectancy (VIE) theories (Kaplan & Schwartz, 1975, 1977; Rosenberg, 1969; and Shelly & Bryan, 1964). Of these, the first two categories primarily concentrate on decision results whereas the latter pair focus upon the psychological and cognitive dynamics underlying the decision-making process.

The four categories of judgment models can be differentiated by the type of group structure used (nominal versus interactive) and the types of judgments employed for deciding among objects or items. Each of the four categories will be briefly reviewed and considered in terms of productivity for group decision making.

Prioritization models use nominal samples of judges to order a given set of objects or statements. The Q-sort technique usually employs 50-100 item cards that are sorted by judges into prioritized categories along some dimension such as important-unimportant or desirable-undesirable. An average or median score is then computed for each item. In the method of paired comparisons, judges evaluate each item against every other item and indicate either which of the two items is more important or if the items are of equal importance. Using this technique with $\underline{n}$ = 50 items would result in $\underline{n}(\underline{n}-1)/2=1,225$ pair-wise judgments per person. A score for each item is tallied by the number of times judges selected it over other items. Both the Q-sort and the method of paired comparisons are ipsative measures meaning that each judge's set of decisions has the same arithmetic average and standard deviation as those of the other judges in the group. While both techniques are somewhat effective and produce sound prioritized lists of items, they do not capitalize on pool-of-abilities and may be inefficient (time consuming), i.e., pair-wise comparisons of 50 items by seven judges would require a great deal of time for each judge to make over 1,000 separate decisions and for the data coding and analysis of some 8,575 collective group judgments.

Scaled ratings can also be used by group members to prioritize items along an importance dimension. Ratings are typically obtained from 5-, 7-, or 9-point rating scales (i.e., 1 = least important to 7 = most important) and are averaged across judges to produce an item score. While this procedure is quicker than other prioritization methods, the drawback of using normative ratings is that many or all of the items may be assigned a most important rating, thereby blurring the just-noticeable-differences among items.

Models for generating alternative items and choosing among alternatives often use both nominal and interactive groups. With the Delphi technique a nominal group of experts is surveyed and asked to list decision alternatives

for some problem. An interactive staff team then summarizes the various alternatives from the independent experts. The summarized results are returned to the experts for review, and the experts are asked to prioritize the alternatives and mail their votes back to the staff team. The staff then computes item scores for each of the alternatives and the top alternatives are selected. While the Delphi has been shown to produce very effective results, the process requires extensive survey time and coordination to develop items as well as to prioritize them.

The nominal group technique (NGT) uses the same experts for both a nominal and an interactive group. The NGT consists of four steps which include 1) the silent generation of ideas in writing, 2) an independent preliminary vote on the importance of the ideas which are summarized by simple rank-orders or average ratings, 3) an interactive discussion of the preliminary vote results, and 4) a final vote by the group. Although statistically weak, the NGT does capitalize on the separate advantages of both nominal and interactive groups and could probably be modified for use with an existing set of alternatives (i.e., MAA deficiency items).

Harless' weighted factor alternative model for front-end-analysis uses an interactive training staff to structure decisions about training problems. The technique includes 1) comparing model performance against actual performance to identify deficiencies, 2) determining if the root cause of the deficiency is due to a lack of skills and knowledges, 3) describing alternative training approaches and assumptions, 4) deriving decision factors, value scales, and factor weights, 5) computing weighted factor scores for each alternative, and 6) assigning priorities to the sum of the weighted factor scores for each alternative. While this model is systematic in producing priorities for a limited number of alternatives, it is primarily concerned with training issues and does not contain a round of nominal group judgments.

The third category of models, policy capturing and judgment analysis, employs relatively large nominal groups of expert raters to evaluate given sets of items or objects. The intent of these techniques is to have raters provide ranks or relative scaled ratings that serve as a judgment criterion. Numerous measurements of other variables that are hypothesized to be functionally related to or predictive of judgments are also taken. Employing multiple linear regression techniques, the judgment criterion is regressed upon the predictor variables to determine the degree of relationship among the predictors and the criterion. Prediction equations can be written for individual members and grouped into a single equation using hierarchical clustering procedures (judgment analysis), or equations may be developed for the group as a whole (policy capturing). The promotion candidate example given previously will serve to demonstrate the usefulness of the policy capturing approach. Nominal group members each rank order 10 candidates for promotion from top to bottom. Lists could be averaged to obtain each candidate's criterion rank score. We could then hypothesize that education and performance reports contributed to the raters' decisions.

If the education (E) and performance (P) scores for each person were available, the criterion scores could be regressed upon the E and P scores. The resulting multiple correlation coefficient $\underline{R}$ would indicate the strength

of the relationship between the E and P information and the candidates' ranks. Examination of the least squares regression weights of the resulting equation would reveal the influence of either E or P upon the group's candidate placement. If the $\underline{R}$ is high, then candidates with low E and P scores would appear lowest on the group's list, and those four canidates with highest E and P scores would be highest on the list and would be selected. Incidentally, the character of the least squares regression equation is such that the linear combination of the weights, w_1 and w_2, times the respective averages for the predictor variables, E and P, plus the regression constant c will always equal the average criterion judgment score $\overline{Y}$. The functional form for the example is:

$$\overline{Y} = w_1 \overline{E} + w_2 \overline{P} + c. \qquad [1]$$

The chief advantage of the judgment policy equation is that once it is set or "captured," predicted rank scores can be calculated for new items (candidates) that have variable scores (E and P) but have never been evaluated directly by the expert board. For instance, a medical combat deficiency list could involve several surgical procedure criteria. If a nominal board's policy was captured for this list, new deficiency items, i.e., other surgical procedures, could be placed into the existing prioritized list by application of a policy equation based on associated predictors. Possible combat related factors might be physical trauma, instrument sterility, surgical staff workloads, etc.

The statistical techniques associated with these models are extremely powerful in modeling nominal decisions and appear to tap some of the underlying logic of a group's decision. However, individual group members do not have the benefit of face-to-face interaction that would likely modify their initial independent policies when making revised group decisions. In addition, the decision models are not as efficient, in terms of time, as the other methods discussed because many hypothesized variables in addition to the criterion decisions must be gathered, coded, and analyzed.

The fourth category of decision-making models includes subjective expected utility (SEU), decision optimization, and valence-instrumentality-expectancy (VIE) techniques. Of several theoretical motivation approaches taken to this area, instrumentality-valence theory as initially advanced by Vroom (1964) and others (Hackman & Porter, 1968) has perhaps proven to be the most prominent. (See Mitchell & Biglan, 1971, and Heneman & Schwab, 1972, for reviews.)

The principle judgment components of VIE theory concern the valence of rewards or outcomes, the instrumentalities of those valences, and the subjective expectancies associated with a series of instrumental-valences in predicting performance and satisfaction outcomes.

Item decisions under these models, like the Harless FEA model, are concerned with developing composite scores for several alternatives based upon prioritized components or factors. Unlike the FEA model, groups are nearly always nominal in structure, and the set of alternative outcomes are specified before the decision making takes place. Items are typically measured in terms of their probability of leading to a certain outcome.

Studies of occupational choice, personnel turnover, and job satisfaction have used these techniques with mixed success (DeLeo & Pritchard, 1974; Mitchell, 1974). The mathematical sophistication involved with measurement of many variables places these techniques with those of judgment analysis and policy capturing models due to the amount of time required for data collection, coding, analysis, and interpretation. Likewise, the techniques lack the use of interactive group decision making.

From this overview it has been shown that nominal group decisions can be used in two ways. First, decision information may be used directly as an end product. Second, results can be input to an interactive group decision. As shown for the the Delphi and NGT methods, group decisions benefit from sequencing nominal and interactive actions. In this regard, the nominal judgments may be viewed as a form of front-end-analysis for the interactive round of decision making.

The following group decision-making model was developed to maximize the judgment productivity for a board of experts. Each of the components of the procedure has been carefully structured to optimize decision-making effectiveness and to limit inefficient actions. Analogous to the medical model, independent judgments for nominal groups which will be defined as J1, may be viewed as an aid to diagnosis, i.e., they provide information about the present state of a given decision-making situation. Revised group judgments, which will be defined as J2, involve a prognosis for the corrective actions to be taken. J2 provides a forecast of the course that a specific deficiency will take in the future. Because of the limited financial and technological resources available to the DOD, not all combat deficiencies will be targeted for and receive corrective action. Therefore, it is vital that the most important medical combat deficiencies be identified.

The Iterative Decision Method (IDM) is a judgmental process structured to capitalize on the J1-J2 sequence and the efficient and effective elements contained in several of the decision-making techniques discussed. Figure 1 displays the general integration of specific decision-making processes that the IDM is based upon. As shown, nominal (J1) and iterative (J2) groups are alternated. In addition to the separate advantages of using both types of groups, the combined use of a nominal group first and a discussion group second results in an increase in effectiveness. Research on NGT and Delphi procedures indicates that when J1 results are used as feedback during the J2 sequence that the aggregation of group judgments increases the accuracy of the judgments (Delbecq et al., 1975; Jaeger, 1982) and allows the members to arrive at decisions which reflect true group preferences (Huber & Delbecq, 1972). In addition to the NGT and Delphi findings, other investigations have consistently shown that the accuracy of decisions increases and the range of judgments decreases after group discussion (Jenness, 1932; Thorndike, 1938; and Timmons, 1942).

To improve the efficiency of the process, deficiency items or task lists are developed by a front-end-analysis (FEA) staff before the decision-making process begins. The use of FEA frees the expert panel from the job of generating or creating the judgment items prior to making decisions. Specific item or task attribute and background information, including

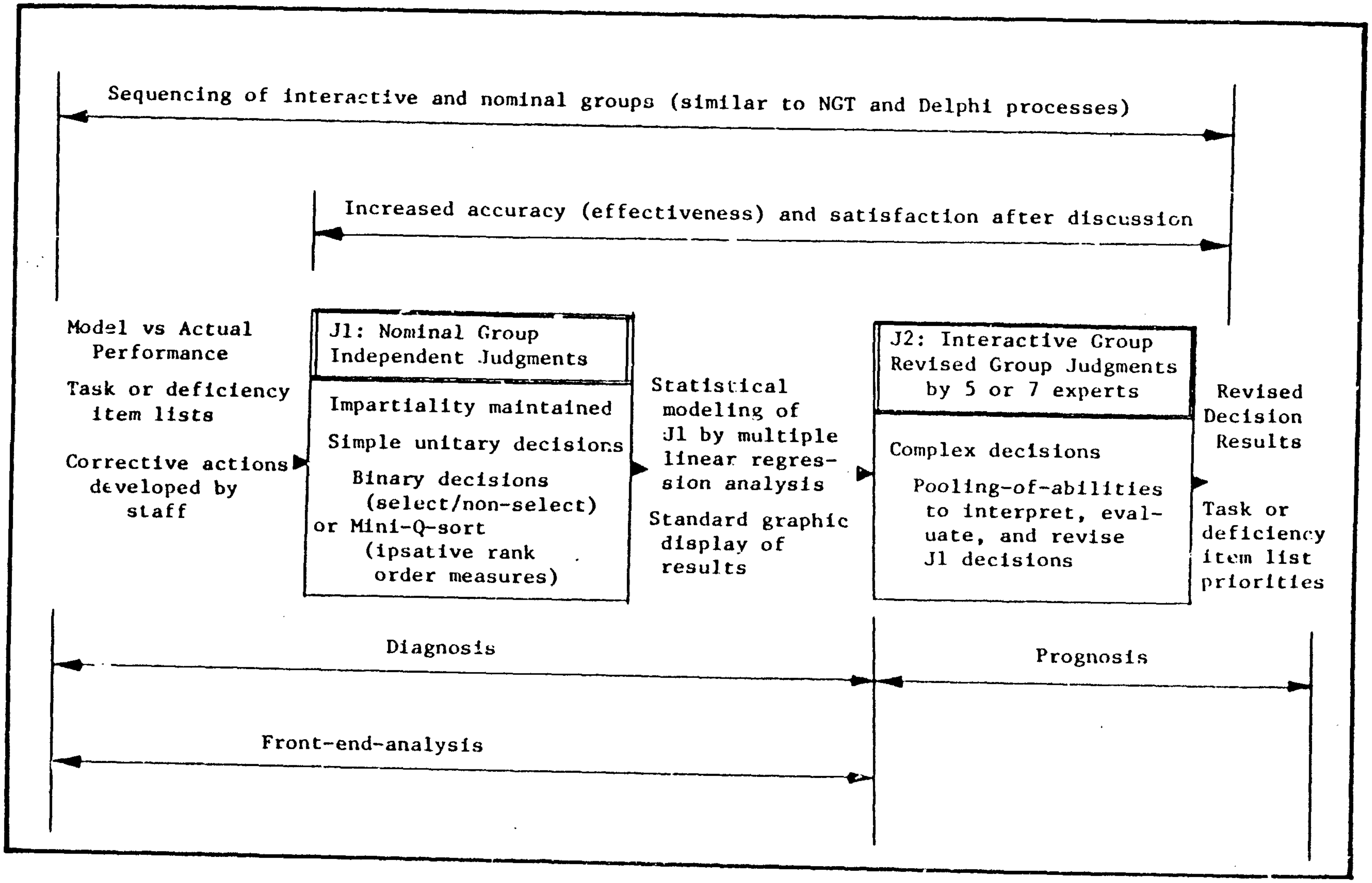


Figure 1. Diagram of the Iterative Decision Method for maximizing the productivity of expert board judgment and decision-making actions. The model is an integration of several decision-making techniques, small group productivity concepts and research, and applied statistical analysis.

potential solutions to problem areas, are also assembled by the FEA staff and made available to experts prior to the J1 meeting. During the J1 round of judgments, decision makers impartially provide simple decisions in reference to the judgment items. For the selection of tasks for training, decisions are either yes or no. For the ranking of items, a small Q-sort procedure is employed to provide independent item priorities. This procedure is more efficient than the verbal round robin sessions of the NGT where each member's idea is recorded on a flip chart before voting takes place. While simple averages help to differentiate among items (or tasks), explicit measures of agreement for items, computed from multiple linear regression equations, provide a more comprehensive and efficient picture of the J1 decision results. Predictive information consists of item variables or both item and judge variables which do not require the collection of information in addition to the decisions themselves. The use of standardized graphic results allows the J2 members to efficiently direct the group discussion and to focus on disagreements which merit attention. The only reason that agreed upon items would be discussed is to identify the rationale used to arrive at the decisions. While this information might be interesting, it is secured at the expense of time which would be better directed to the pressing problem areas. For the sake of efficiency, differing expert positions are only identified when they are associated with disagreement. In addition to the enhancement of expert decision productivity, the IDM provides an accurate audit trail of the entire decision-making process.

The validity associated with the use of the J1 - J2 technique depends upon two requirements. First, the FEA must be comprehensive and cover the full domain of possible judgment items. The quality of the decision output directly reflects the quality of the input items; if the deficiency lists are incomplete the resulting J2 prioritization will also be incomplete. Second, experts must be cooperative and, as a sample, be representative of the decision-maker population. They should also have performance-based abilities and experiences with reference to the domain of judgments.

The iterative nature of the method is designed to quantify expert opinions (J1) and to refine the opinions through discussion (J2). Recent research indicates that opinions formed on the basis of direct experience are more consistent with subsequent behavior than opinions derived from external sources such as persuasive communication or other indirect means (Reagan & Fazio, 1977; Fazio, Zanna, & Cooper, 1978). With this form of decision making there are no correct or incorrect opinions, however, the probability of 100% consensus for all J1 decisions is very unlikely. The objective of the process is to have the group arrive at an acceptable level of agreement; it is not necessary that 100% consensus be obtained. Some expert disagreement is required for the process to work. Indeed, too much agreement might indicate 1) that the domain of items is restricted, 2) that the judgments regarding the items require little or no discrimination, 3) that some board members are not experienced enough to consider the complexity of the issues, or 4) that undue pressure or influence among group members has produced a "rubber-stamp" effect.

METHOD

Selection of Expert Panels

Two panels of experts were employed in the present study. The first panel was selected from the Academy of Health Sciences (AHS) at the request of the Director of Combat Development and was made up of the seven member AHS Force Integration Committee (FIC). The J1-J2 decision-making method was employed with the FIC experts and used the initial MAA list compiled by the combat developments staff. The revised group list produced as an output from the FIC became the input for a second round of judgments rendered by a board of seven AMEDD general officers or their representatives. Members of the General Officer Board were selected to insure that each of the primary policy-making organizations of the Army Medical Department were represented. Members of both panels were contacted by telephone and provided with a read-ahead package which contained the MAA deficiency lists and a description of the prioritization method. Both expert panels were convened during July, 1982, at AHS.

The IDM Process for Ipsative Measures (Rank Data)

The Iterative Decision Method (IDM) was developed by the Individual Training Division of AHS for the selection and prioritization of AMEDD tasks for training (Finstuen, Note 1). The process does not make decisions, but rather provides information to guide the decisions of an expert military board. The process was originally designed for dichotomous (1-0) selection ratings and 3- or 7-point prioritization ratings. The IDM has been used in several research projects at the Academy, most recently in the Advanced Medical Specialist 91B30 study (Carrol & Finstuen, Note 2). The ranking procedure described in this paper is a special application of the IDM and consists of several steps as shown in Figure 2.

Procedures and instrumentation. Medical combat deficiency statements were transcribed onto decks of 3 x 5 cards. Panel members sorted the card decks, one deck for each of the 13 major deficiency lists, so that the items judged to be more important were at the top and those items of lesser importance were at the bottom of the deck. (See Fig. 3 for an example of the process.) Experts were asked to work independently and provide their own individual rank orders.

Independent judgments were statistically analyzed with a series of special application APL computer programs. In addition to standard descriptive statistics, i.e., average item ranks and standard deviations, three statistical indices were computed for each list. Indices reflected the goodness-of-fit for a group equation which expressed the individual judgments as a function of a set of binary item predictor variables (McNeil, Kelly, & McNeil, 1975; Ward & Jennings, 1973), an index of the inter-rater reliability based on intra class correlation (Finstuen & Campbell, 1979; McNemar, 1979; Myers, 1979; Johnson, Jones, Butler, & Main, 1981), and an *F* test which expressed the results of testing the hypothesis of item rank mean differences (Guilford & Fruchter, 1973). The three statistical indices provided interrelated feedback information about the J1 decisions in much

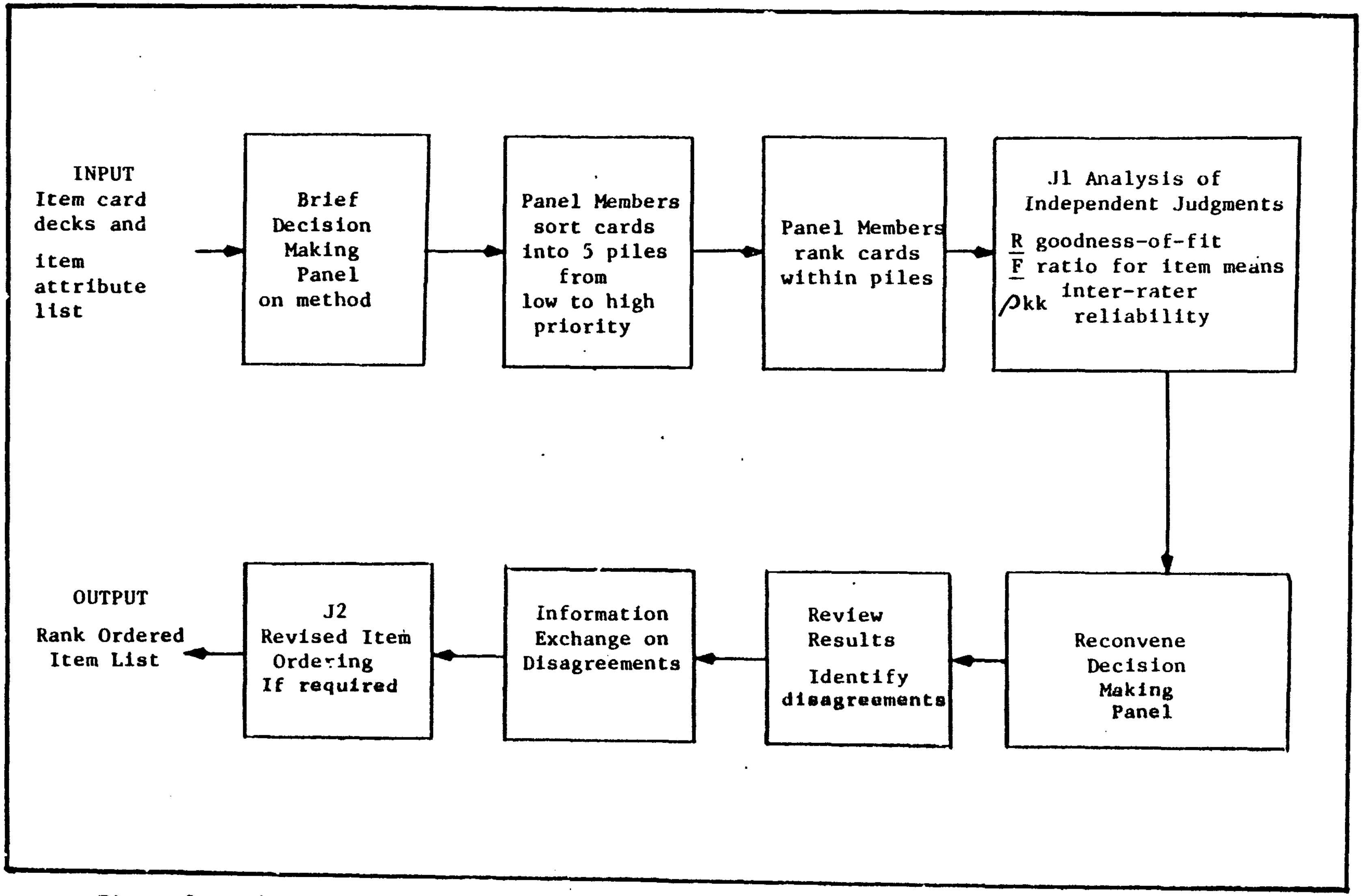


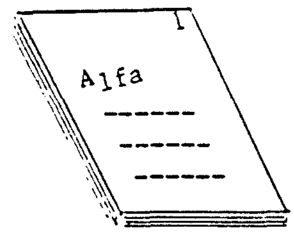
Figure 2. Schematic of the Iterative Decision Method (IDM) process for ipsative item prioritization. Elements on the top row identify J1 independent judgment procedures, elements on the bottom row identify J2 revised group judgment procedures.

OBJECTIVE: To have a panel of k persons rank order a list of n items.

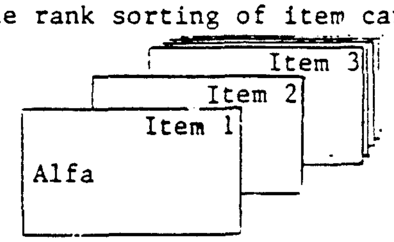
Example for
k = 5 persons
n = 12 items

List Nr.	Item description
1	Alfa
2	Bravo
3	Charlie
4	Delta
5	Echo
6	Foxtrot
7	Golf
8	Hotel
9	India
10	Juliette
11	Kilo
12	Lima

To aid their judgments panel members consider sub item attributes described in a reference list

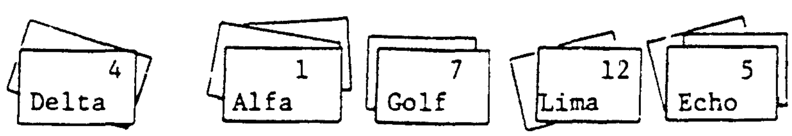


PROCESS: Force rank sorting of item cards by panel members



1. Each panel member sorts cards into 5 piles with at least 2-3 cards per pile ranging from least important (Left) to most important (Right).

Least Important



Most Important

2. Starting with the most important pile, members order their cards from high to low. They then order the next most important pile, and so on, until all piles have been prioritized.
3. Members then collate their cards and go through the entire deck one last time to "fine-tune" the item order.

Figure 3. Rank order prioritization procedures

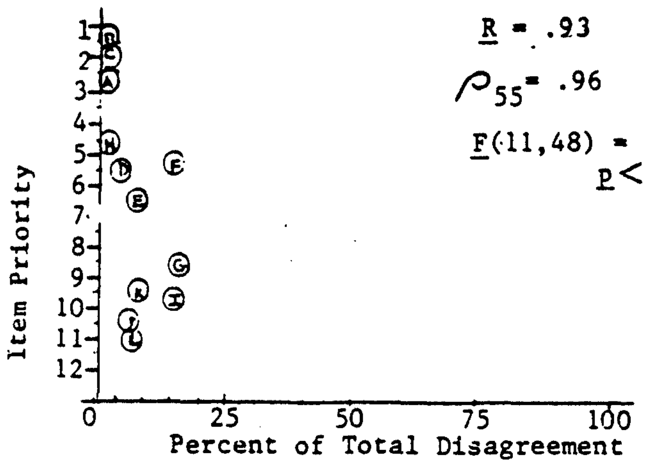
ANALYSIS: Card orders from all panel members are entered into a decision matrix. For example--

Nr.	Item	Panel Member A	B	C	D	E	Average Item rank
1	Alfa	3	3	3	2	3	2.8
2	Bravo	1	1	2	1	2	1.4
3	Charlie	2	2	1	3	1	1.8
4	Delta	6	7	4	6	6	5.8
5	Echo	8	5	8	5	7	6.6
6	Foxtrot	5	4	6	9	4	5.6
7	Golf	9	8	7	12	8	8.8
8	Hotel	4	5	5	4	5	4.8
9	India	10	9	10	7	12	9.6
10	Juliette	11	11	11	8	11	10.4
11	Kilo	7	10	9	11	10	9.4
12	Lima	12	12	12	10	9	11.0

All panel member averages = 6.5 since forced ranks are ipsative measures.

1. Average item ranks are computed.
2. A group equation is computed to express the overall rank order agreement of the entire panel.
3. A goodness-of-fit measure $\underline{R}$ for the equation is computed.
4. The reliability of the rank averages ρ_{kk} is computed.
5. Test of the hypothesis for significant differences among average item ranks $\underline{F}$.

RESULTS: A graph is produced based upon the group equation which prioritizes the items and indicates the amount of agreement-disagreement among the panel.



$\underline{R} = .93$

$\rho_{55} = .96$

$\underline{F}(11,48) = 29.85$, $\underline{p} < .01$.

Final Rank	Item	(List Nr.)
1	Bravo	(2)
2	Charlie	(3)
3	Alfa	(1)
4	Hotel	(8)
5	Foxtrot	(6)
6	Delta	(4)
7	Echo	(5)
8	Golf	(7)
9	Kilo	(11)
10	India	(9)
11	Juliette	(10)
12	Lima	(12)

Figure 3. (continued)

the same manner that the speedometer, odometer, and gas gauge provide related information about a cross-country automobile trip. The indices were referred to during the interactive group process to determine which actions should be taken during the meeting.

The goodness-of-fit index is the multiple correlation coefficient associated with an equation which simultaneously models all items and all judges in terms of their separate contributions to the variance of the matrix of decisions rendered by the board. As shown in Figure 3 the individual items may then be plotted in terms of their level of priority (average rank mean) and in terms of the amount of disagreement associated with each item. The percent of disagreement is calculated by dividing each item's sum of squared residuals from the group equation by the total sum of squared residuals (TSSR) associated with the group equation. The square of the goodness-of-fit ($\underline{R}^2$) index measures the proportion of variance accounted for by the equation and is directly related to the TSSR by:

$$\underline{R}^2 = 1.0 - \frac{\text{TSSR}}{n * \sigma^2} \qquad [2]$$

where TSSR is the error sum of squares of prediction and $n * \sigma^2$ is the total sum of squares for the decision matrix.

The statistical indices and the average item plots provide information and suggestions about how to proceed in the interactive group mode for rendering revised group judgments (J2). As shown in the example (Fig. 3), items f and g were more disputed than items b or j. The J1 results reflect the decisions from the nominal group. Members were a group in name only since they did not confer with one another in making their judgments. When the board was reconvened at J2, they examined the J1 results to identify those items upon which they already agreed upon in terms of importance. (See Fig. 2.) The advantage of this procedure was that time could then be devoted to those items which were in disagreement and merited discussion.

Since board members were experts, there were no right or wrong answers; however, the expert opinions when arrayed collectively indicated majority and minority positions. The J2 interacive group was used for information exchange and revised independent judgments to arrive at a group judgment. One hundred percent consensus was not required; however, the goodness-of-fit and reliability estimates did increase as agreement among expert members increased.

The technology of the IDM process produces a rank ordered list of medical combat deficiencies based upon the merger of the expert opinions of the board members and the content of the mission area analysis fact sheets. (The reference list shown in Fig 3 contained MAA deficiency descriptions.) The medical combat deficiency lists used in this study are at Appendices I through III. Examples of MAA corrective actions are contained in Appendix IV.

Procedural effectiveness. When the J2 session was over, experts filled out questionnaires containing biographical and experience items and a series of questions designed to measure the members' perceptions of the prioritized deficiency lists. These questions, with 7-point response scales anchored at each point, were employed to assess the effectiveness of the J1-J2 procedure. Experts were asked to rate their individual and revised group judgments along each of the four dimensions of confidence, accuracy, felt utilization of expertise, and overall satisfaction. According to small group productivity sources cited earlier, it was hypothesized that experts would perceive the revised group outcomes (J2) more favorably than the independently judged outcomes from J1. A sample background and perception assessment questionnaire is included in Appendix V.

RESULTS

The overall results of this research indicated that experts ranked medical combat deficiencies in a similar fashion, that they felt comfortable with the results, and that both the subarea and major deficiencies which resulted were prioritized in an appropriate order of importance.

Scope of Decisions

In human judgment research there is often a trade-off between gathering a few measures on many participants and gathering many measures on a few participants. Since expert panels consisted of only seven persons each, the use of multiple rank order decision measures became a necessity. Each of the seven FIC members rendered rank order decisions on each of 68 deficiency items, which resulted in a total of 476 independent decisions. Placement of all items was reviewed in the J2 condition which doubled the number of observed decisions from FIC experts to 952. Subsequently, two items were deleted from the deficiency lists during the J2 interactive group discussion. The AMEDD General Officer Board deliberated upon each of the remaining 66 items producing 462 independent decisions and 462 group decisions, or a total of 924 item decisions. The seven AMEDD experts also rank ordered each of the major 13 deficiency lists independently (91 decisions) and in the group mode which resulted in 2 x 91 = 182 decisions. In addition, eight procedural effectiveness variables were rated by all 14 experts for a total of 112 perception measures. In all, this research considered some 2,170 ranking decisions over a period of two days. Considering that 14 experts spent about a day for the J1-J2 sessions, the prioritization process amounts to 112 decision manhours.

Composition of Expert Panels

Table 1 presents the pertinent background and experience characteristics of the expert committee and board members used in the study. With regard to the FIC, six of the seven experts held the rank of colonel (O-6) and one member held the rank of lieutenant colonel (O-5). All committee members were male and represented organizations within the Academy of Health Sciences and included the Deputy and Assistant Commandants, the Directors of Training, Training Development, Support, Medical Equipment Test and Evaluation, and Chief of the Training Evaluation Division (now the Directorate of Evaluation). All FIC experts belonged to the Army Medical Service Corps, and specialties varied from 67A (Health Care Administration), 67F (Health Services Personnel Manager), 67K (Health Services Materiel Officer), to four personnel in 67H (Health Services Plan, Operations, Intelligence, and Officer Training).

The average age of committee members was 48.29 years, with an average of 18.71 years of formal education. Altogether the committee had served a total of 174 years in the military (mean = 24.86) with 166 years or 95.40% served in AMEDD units (mean = 23.71 years). Individuals had spent an average of approximately 17 years in their current specialty, with some five years previously spent in other medical corps specialties. Table of Distribution and Allowances (TDA, e.g., fixed hospital facilities)

Table 1

Composition of the AHS Force Integration Commitee and the AMEDD General Officer Board Employed in Ranking Mission Area Analysis Deficiencies

Background Variable	AHS Force Integration Committee		AMEDD General Officer Board	
	Mean	Std Dev	Mean	Std Dev
Biographical Characteristics				
Age in years	48.29	4.89	50.71	2.25
Education in years	18.71	1.39	21.71	2.71
Military Experience in Years				
AMEDD unit assignments	23.71	5.26	22.29	2.60
Current job (67A,F,H,K)	17.29	5.72	---	---
Previous job (67B,J,K)	5.57	5.97	---	---
TDA assignments	16.71	3.88	20.00	3.25
TOE assignments	8.00	3.42	3.43	3.02
Total Active Military Duty in years	24.86	5.00	23.43	2.97
Months Served in Combat Zones	12.71	6.82	5.57	6.50

NOTE: Both groups consisted of n=7 experts.

assignments accounted for 117 years of service compared with 56 years of collective experience in Table of Organization and Equipment (TOE, e.g., field type units) assignments. All but one committee member had at least 12 months of combat experience in either Korea or the Republic of Vietnam.

The composition of the seven member AMEDD General Officer Board was as follows: one officer in the grade of major general, four brigadier generals, and two senior level colonels. All experts were male, and were assigned to either the Medical, Dental, or Veterinary Corps of the Army Medical Department (AMEDD). Organizations represented by the board consisted of the Office of The Surgeon General (OTSG), US Army Health Services Command (HSC), 7th Medical Command (MEDCOM), the Academy of Health Sciences (AHS), and the US Army Medical Research and Development Command (USAMRDC).

The average age of the board members was 50.71 years, with an average of 21.71 years of education including physician and dental specializations. Collectively the board had 164 years of active duty Army experience (mean = 23.43 years) of which 156 or 95.12% had been spent in AMEDD units. Of the

164 years of active duty, 140 years (85.37%) were served in TDA assignments and 24 years (14.63%) were served in TOE assignments. In addition, three members indicated that they had served a total of 39 months in combat zones including the Republic of Vietnam and Lebanon, resulting in an overall average of 5.57 months of combat experience for the board.

The fact that the overall time spent in TDA assignments for both committee and board members outweighs TOE assignments by better than three to one is worthy of comment. This finding is not unusual considering the nature of the AMEDD mission which is to provide medical care in peacetime as well as wartime. Since the experts were physicians, dentists, and health care/services managers, most of their personnel assignments would be in hospital and medical training (TDA) units.

In summary, the combined military experience resources of both groups of experts represented some 338 years of active Army duty with 322 years reflecting medical assignments, cutting across 80 years of TOE and 257 years of TDA assignments and details. Further, the time accounted for in combat environments for all 14 experts totaled 128 months or a total of 10.67 years.

In light of the wealth of military medical experience and expertise represented by the members of the committee and board described above, the results of this study constitute a defensible and comprehensive basis for determining the rank order of medical combat deficiencies.

Procedural Effectiveness Measures

Four measures of the efficacy of the J1-J2 sequence were obtained from 7-point rating scales which assessed the experts' perceptions of confidence, accuracy, felt utilization of expertise, and overall satisfaction with regard to the item ranking decisions.

Table 2 presents the means and standard deviations of the procedural effectiveness measures for both the AHS and AMEDD expert groups. As indicated in the table and the accompanying figure (see Figure 4), gross perception ratings for all dimensions combined generally increased from the independent to the revised group judgment condition with $t(27) = 2.67$, $p < .05$, for committee perceptions, and $t(27) = 4.26$, $p < .001$, for general officer perceptions. This finding indicated that overall, experts felt more comfortable with their revised group judgments than with their initial independent decisions. Also, all ratings were well above the neutral position (4.0) on the 7-point rating scale indicating that all perceptions were regarded as positive.

Two 2 x 4 analyses of variance with repeated measures were used to determine the specific variations in perceptions attributable to independent versus revised group judgments (J1 versus J2) and the four assessment dimensions (Table 3). In reference to the FIC group, the main effect for perceptions was significant, $F(3,18) = 10.05$, $p < .001$. FIC experts reported that they were satisfied and confident more often with both independent and group ranks, but that they felt less positive about the utilization of their expertise. This finding can be attributed to the fact that two experts reported they did not receive the read-ahead package until

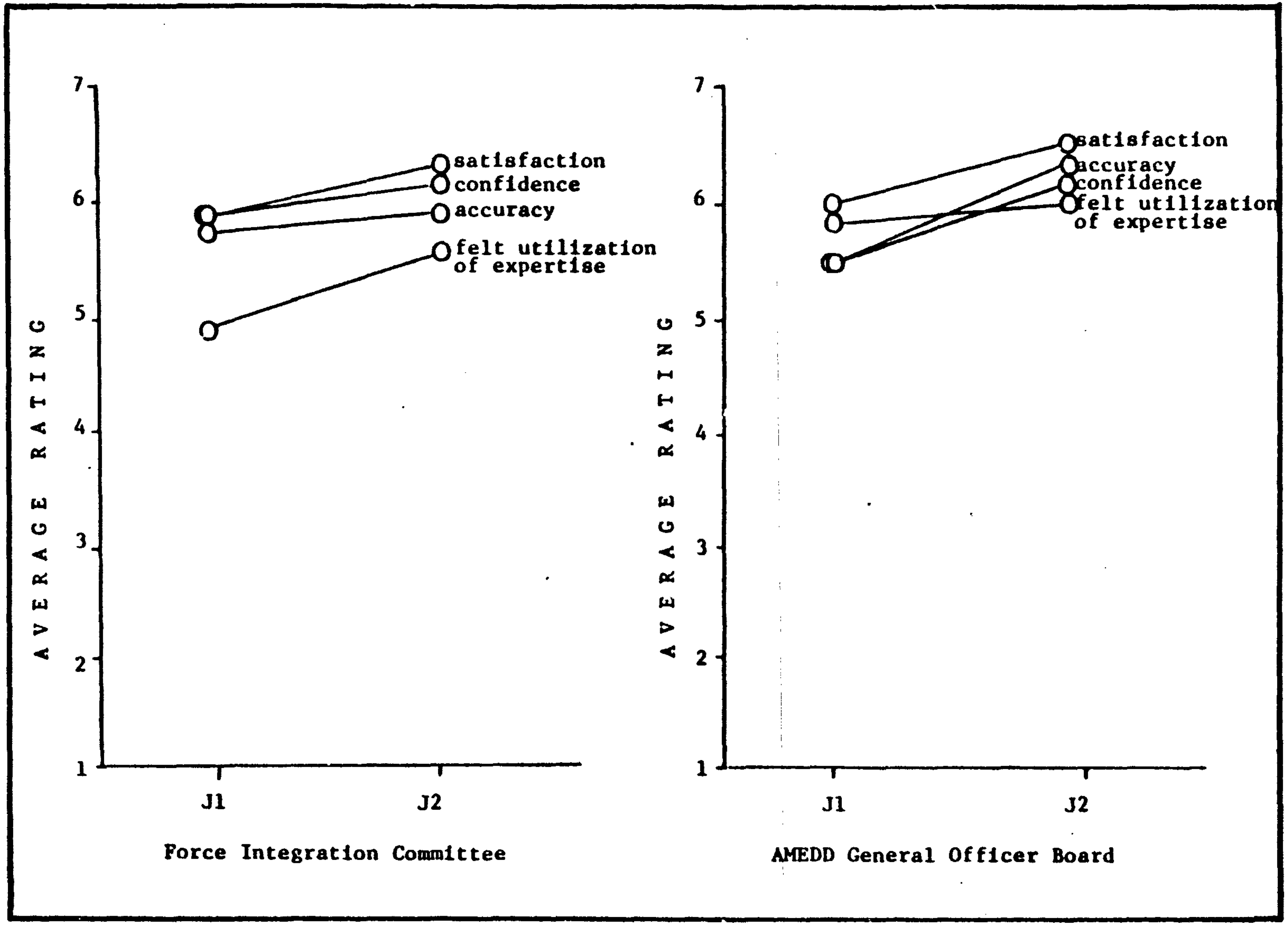


Figure 4. Analysis of experts' perceptions of prioritization list results for independent (J1) and revised group (J2) judgments.

Table 2

Perceptions of Independent Versus Revised Group

Rank Judgments of Combat Medical Deficiencies

Assessment Dimension	Independent Judgements		Revised Group Judgments	
	Mean	Std Dev	Mean	Std Dev
AHS Force Integration Commitee				
Confidence	5.86	.83	6.14	.64
Accuracy	5.71	.45	5.86	.35
Felt utilization of expertise	4.86	.99	5.57	.49
Overall satisfaction	5.86	.64	6.29	.70
All dimensions combined	5.57	.86	5.96	.63
AMEDD General Officer Board				
Confidence	5.57	.49	6.14	.35
Accuracy	5.57	.49	6.29	.70
Felt utilization of expertise	5.86	.64	6.00	.53
Overall satisfaction	6.00	.76	6.43	.49
All dimensions combined	5.75	.63	6.21	.56

NOTE: Perceptions were assessed on 7-point rating scales with higher values indicating a greater amount of the dimension being measured.

the day the committee met, so they felt less prepared than other members. However, in reference to each of the separate assessment dimensions, members saw little difference among their independent and group judgments. These findings indicated that the FIC experts did not perceive the need for substantive group revisions of their initial independent decisions.

Results from the General Officer Board differed markedly from the FIC member perceptions. The main effect for J1 - J2 decisions was pronounced with $\underline{F}(1,6) = 11.27$, $\underline{p}<.05$. This finding indicated that the officers of the second board felt that their revised group rank orders of combat deficiencies were more accurate, utilized their expertise to a greater degree, and that they felt confident and satisfied with the revisions made by the group.

In addition, the absence of interaction effects in both analyses indicated that the J1 - J2 procedure was not differentially effective across assessment dimensions, and that any changes in perceptions were invariably in an upward direction.

Shifts in specific procedural effectiveness measures. While trends in perceptions exhibited upward changes, changes were not always equal in magnitude. For the confidence dimension, an initial average rating of 5.86--between somewhat (scale value = 5) and very (scale value = 6) confident--was recorded for the FIC independent combat deficiency rankings.

Table 3

Analysis of Variance Summaries for Expert Panel Perceptions

Source	SS	df	MS	*F*
	Force Integration Committee			
Within subjects	10.36	6	-	-
J1 vs J2 (J1J2)	2.16	1	2.16	2.09 n/s
Perceptions (Prcn)	6.34	3	2.11	10.05**
J1J2 x Prcn	.63	3	.21	.83 n/s
Residuals				
J1J2	6.21	6	1.04	
Prcn	3.79	18	.21	
J1J2 x Prcn	4.50	18	.25	
Total	33.98	55		
	AMEDD General Officer Board			
Within subjects	11.61	6	-	-
J1 vs J2 (J1J2)	3.02	1	3.02	11.27*
Perceptions (Prcn)	1.05	3	.35	2.24 n/s
J1J2 x Prcn	.63	3	.21	1.67 n/s
Residuals				
J1J2	1.61	6	.27	
Prcn	2.82	18	.16	
J1J2 x Prcn	2.25	18	.12	
Total	22.98	55		

NOTE: ** $p<.001$, *$p<.05$, n/s = nonsignificant

Subsequently, FIC experts reported an increase in their confidence rating of .28 resulting in an average of 6.14 (very confident) for the revised group ranks of the same deficiences. For the General Officer Board, the average confidence ratings increased by .57 of a scale point from 5.57 (between somewhat and very confident) to 6.14 (very confident).

The average accuracy ratings of FIC experts shifted from 5.71--between somewhat (5) and very (6) accurate--to an average of 5.86, slightly closer to very accurate. However, average accuracy ratings from general officers increased by .72 scale points from 5.57 (between somewhat and very accurate) to 6.29--between very (6) and extremely (7) accurate.

The J1 - J2 average rating shift for FIC felt utilization of expertise was dramatic also. The initial independent average rating of 4.86 fell between quite (4) well and very (5) well. The mean rating for the revised group decision exhibited an increase of .71 scale points to 5.57 (between very well and excellently). General officer ratings of felt utilization increased from 5.86 to 6.00.

Finally, the highest averages among all perceptions were displayed by the satisfaction dimension for both groups. For FIC experts, the J1

satisfaction average increased by .43 from 5.86 (between somewhat and very satisfied) to 6.29 (between very and extremely satisfied) for the J2 condition. Likewise, an increase of .43 from 6.00 (very satisfied) to 6.43 (between very and extremely satisfied) was observed for the General Officer Board.

In summary, the J1-J2 exercise appeared to be meaningful and useful for both groups of experts and tended to enhance their perceptions of the rank order priorities of MAA medical combat deficiencies.

Force Integration Committee (FIC) - Independent Judgments (J1) of Medical Combat Subarea Priorities

Table 4 presents a summary of the independent judgments rendered by the FIC. Results were associated with 68 deficiencies within 13 major lists (see column 1). Letters identify each subarea item (column 2) and are rank ordered from most to least important by the average of the item ranks assigned by the seven experts. The last three columns of the table display the three summary statistics used 1) to determine the degree of predictive goodness-to-fit for the 13 separate group regression equations (multiple correlation coefficient R), 2) to assess the levels of internal consistency among experts (rho = coefficients of inter-rater reliability), and 3) to test hypotheses of significant differences among item rank means within each list (F ratios with associated degrees of freedom).

The multiple R is a measure of the goodness-of-fit for a given group prediction equation which simultaneously expresses the decisions for a list as a function of both items and experts. A maximum value of 1.0 for R indicated perfect predictability of the experts' decisions in regard to the rank order of items (e.g., list 8 - Preventive Medicine). Values from about .60 to .80 indicated fair to good prediction (lists 1, 3, 7, 9, and 11), and values of .80 to above (lists 2, 4, 12, and 13) indicated good to excellent results for group equations. Multiple R results of less than .60 (lists 5, Optometry/Optical; 6, Dental; and 10, Clinical Lab/Blood Bank) represented weak predictions of independent judgments and may be interpreted as a signal which indicated that group discussion J2 was probably required on those particular lists.

The inter-rater reliability coefficients measured the internal consistency among the experts' ranks and can be interpreted as follows. A given list of items has a set of average ranks assigned to it by the seven experts. If the same list of items were to be ranked by another comparable set of seven experts, then the expected correlation between the two sets of item rank means would result in the value indicated by rho_{77}. Reliabilities of .80 and above represented acceptable levels of inter-rater agreement, and 1.0 indicated perfect agreement (e.g., list 8). Reliabilities below .80 indicated disagreements among the experts and again lists 5, 6, and 10 were identified as requiring group discussion.

Finally, the F ratios were used to test the hypotheses that item rank means within lists were statistically different from one another. High F ratios indicated that experts could discriminate among items in terms of importance, and that not all items were judged to be of similar or equal

Table 4

Summary Results for Mission Area Analysis of Medical Combat Deficiencies
Rank Data From AHS Force Integration Committee

J1 Independent Judgments

Major Deficiency List	Item rank order (most to least important) 1 2 3 4 5 6 7 8 9 10 11 12 13	N Items	Goodness-of-fit R	Reliability ρ_{77}	Item Rank Mean Differences F[a]
1. Medical Treatment	e c f b d g a h	8	.78	.89	F(7,48)=10.48 **
2. Force Structure	a k d c g j b l f e h i	12	.81	.91	F(11,72)=12.81 **
3. Medical Logistics	k f e h d c g j m i a l b	13	.70	.82	F(12,78)= 6.11 **
4. Evacuation/Regulating	c a b	3	.87	.95	F(2,18)=27.75 **
5. Optometry/Optical	b a	2	.14	$\approx$0.0	F(1,12)$<$1.0 , n/s
6. Dental	b a c	3	.49	.49	F(2,18)= 2.92, n/s
7. Veterinary	b a	2	.71	.84	F(1,12)=12.50 *
8. Preventive Medicine	b a	2	1.00	1.00	F(1,12) ---
9. Command, Ctrl, Comm.	d b e a c	5	.75	.87	F(4,30)= 9.51 **
10. Clinical Lab/Blood Bank	e d a c b	5	.31	$\approx$0.0	F(4,30)$<$1.0 , n/s
11. Chemical	f a c e d b g	7	.74	.86	F(6,42)= 8.64 **
12. Nuclear	a b c	3	.87	.95	F(2,18)=27.75 **
13. Biological	a b c	3	.87	.95	F(2,18)=27.75 **
	Total	68			

Note: Underlined items indicate adjacent tied item rank averages. Ties were broken by listing the item with the least squared residual proportion (least disagreement) first.

[a] n/s = non-significant, ** $p<.001$, * $p<.01$

J2 Revised Group Judgments Rendered By Unanimous Vote

Lists reordered

5. Optometry/Optical reordered a-b
6. Dental reordered b-c-a
10. Clin. Lab/Blood reordered e-d-a-b-c

List 2. Force Structure reworded to Medical Resources

Items Deleted from Lists

2. Force Structure deleted item k-field treatment of combat stress
9. Command, Ctrl, Comm. deleted item a-Dental/Vet communications

Items Moved Between Lists

From List 3. to List 1. - Monitor vital signs in MOPP deficiencies
From List 2. to List 3. - Power/illumination deficiencies

importance. The probability associated with an F indicated the odds that each F could have occurred by chance. For instance, if list 1 -- Medical Treatment -- were rank ordered 1,000 times we would expect a value of 10.48 or greater to occur only once by chance alone. All lists achieved significance with the exception of the same three lists identified above. As shown, lists 5, Optometry; 6, Dental; and 10, Clinical Lab/Blood Bank failed to exhibit statistically significant differences among the item means.

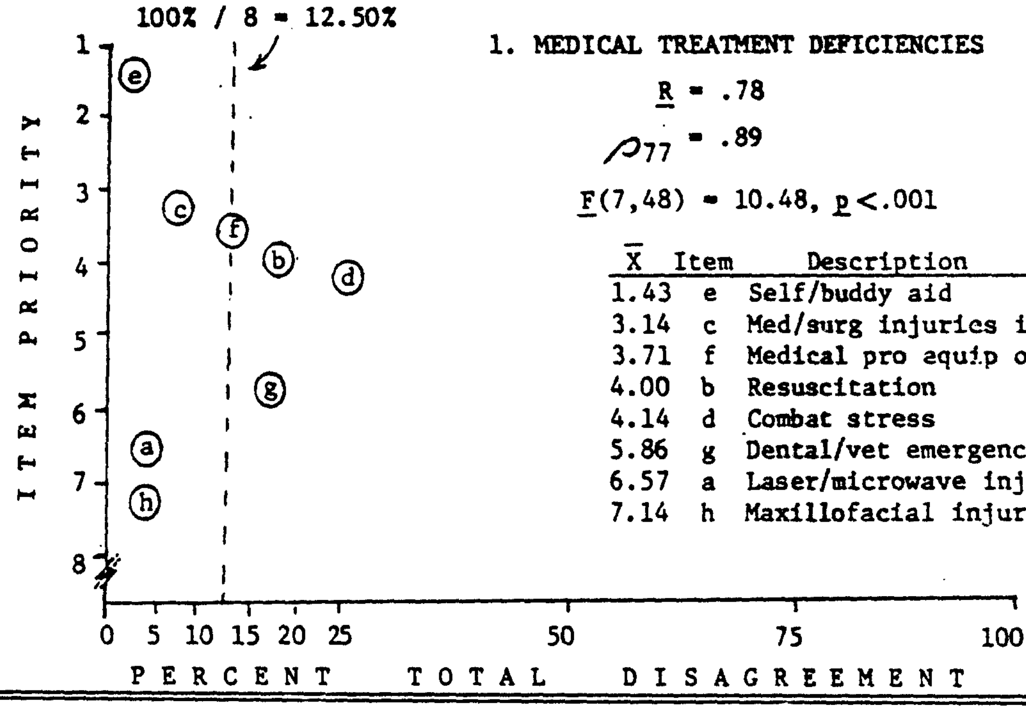
Overall, 58 out of the 68 subarea items were ranked in an acceptable order based on the interpretation of the statistical analyses. Only 10 of the 68 items (14.71%) contained in three lists indicated that interactive group discussion was required to identify the rationale that experts had used in making their judgments.

Figure 5 displays the separate graphic analyses conducted for each major discrepancy list. As shown by the standard graphic display for Medical Treatment, subarea item means were plotted vertically by priority and horizontally by the amount of disagreement associated with each item. The percent of disagreement for each item was computed as the proportional lack-of-fit obtained from the squared residual scores of the group prediction equation. Each graph also contains a baseline (dashed vertical line) which indicates a hypothetical equal amount of disagreement per item. For list 1, if all items had an equal amount of disagreement then the baseline was computed as 100% divided by 8 items or 12.50%. Items plotted to the left of the baseline exhibited less than the average error of prediction (disagreement), and those to the right demonstrated more than an equal share of lack-of-fit. For Medical Treatment, item e (Self/buddy aid) showed little expert disagreement that it should be placed at the top of the list (mean = 1.43, percent disagreement = 3.19%). Likewise, there was little disagreement that items a (Laser/microwave injury) and h (Maxillofacial injury) were of less importance than other items on the list. Specific results for the remaining FIC judgments follow.

Leading Medical Force Structure deficiencies consisted of COMMZ hospital items (a and d) and Field treatment of combat stress (k). As shown, the multiple correlation (.81) and reliability (.91) associated with these judgments were high, and items were well distributed throughout the range of priorities indicated by the statistical significance of the F ratio.

Medical Logistics deficiency judgments resulted in a moderate level of prediction and an adequate amount of inter-rater reliability. Several trends emerge with regard to logistics items.

First, the list contained one 3-way tie (items concerning h, Refrigeration; d, Monitor vital signs in MOPP gear; and c, Eye protection) and one 2-way tie (items m, Covered storage, and i, Material handling equipment). Ties do not present problems when squared residual analyses are used. The per item contributions to the total group prediction equation's sum of squared residuals (percent of disagreement) are different for each tied item so tied ranks do not require special adjustments (cf. Guilford & Fruchter, 1973, pg. 284) and can be ordered by listing items with the smallest amount of disagreement first.



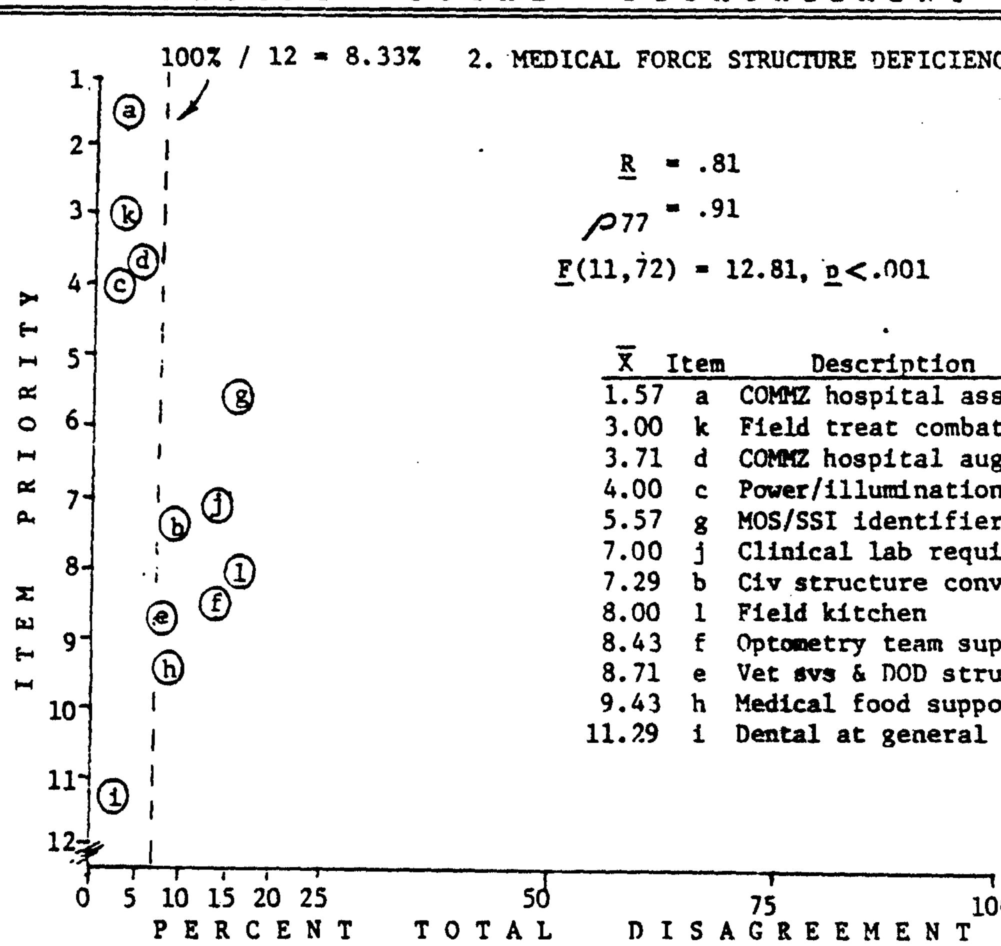
1. MEDICAL TREATMENT DEFICIENCIES

$\underline{R} = .78$

$\rho_{77} = .89$

$\underline{F}(7,48) = 10.48$, $\underline{p} < .001$

$\overline{X}$	Item	Description
1.43	e	Self/buddy aid
3.14	c	Med/surg injuries in battle
3.71	f	Medical pro equip operation
4.00	b	Resuscitation
4.14	d	Combat stress
5.86	g	Dental/vet emergency
6.57	a	Laser/microwave injury
7.14	h	Maxillofacial injury



2. MEDICAL FORCE STRUCTURE DEFICIENCIES

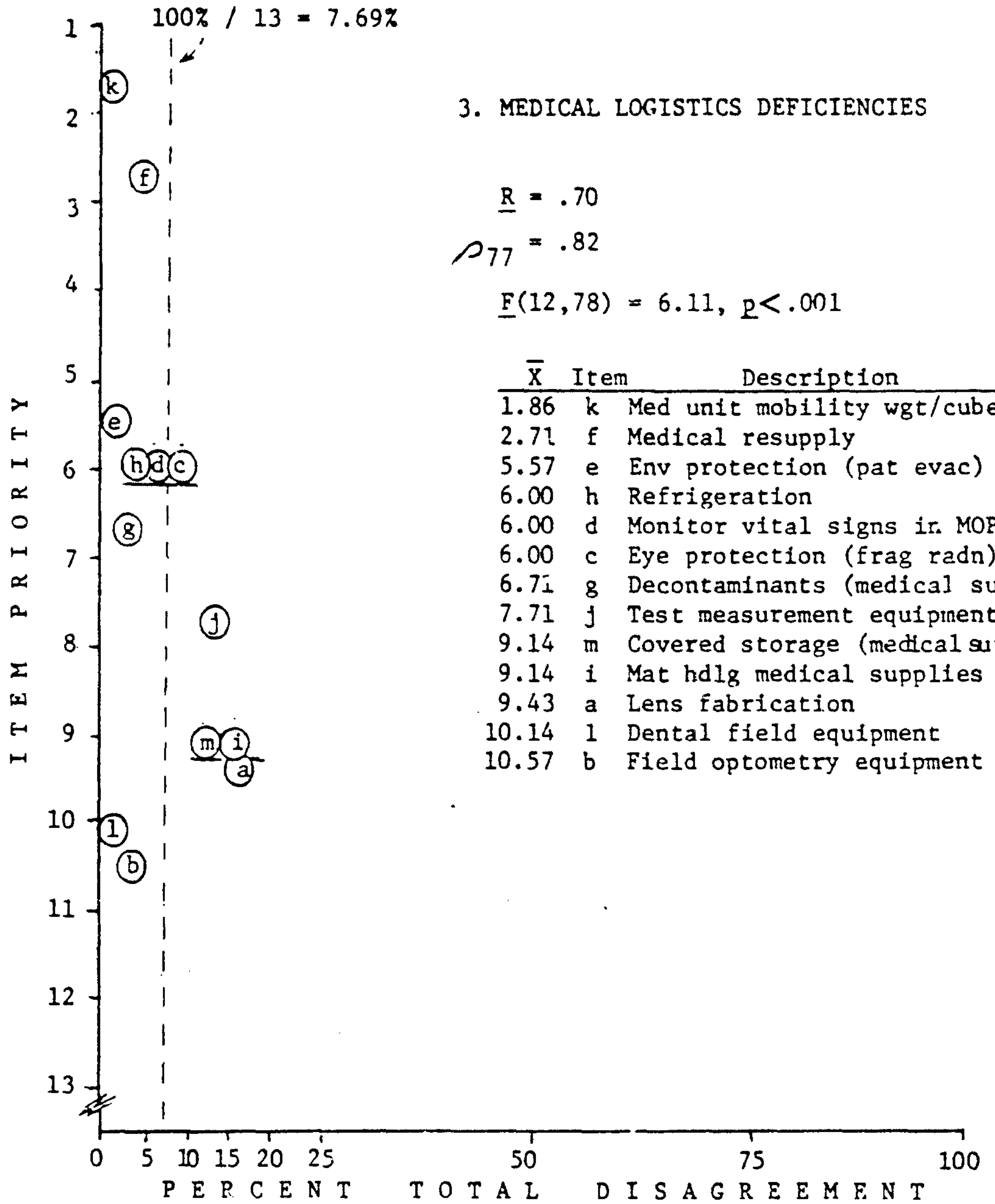
$\underline{R} = .81$

$\rho_{77} = .91$

$\underline{F}(11,72) = 12.81$, $\underline{p} < .001$

$\overline{X}$	Item	Description
1.57	a	COMMZ hospital assets
3.00	k	Field treat combat stress
3.71	d	COMMZ hospital augmentation
4.00	c	Power/illumination
5.57	g	MOS/SSI identifiers
7.00	j	Clinical lab requirements
7.29	b	Civ structure conversion
8.00	l	Field kitchen
8.43	f	Optometry team support
8.71	e	Vet svs & DOD structure
9.43	h	Medical food support
11.29	i	Dental at general hospital

Figure 5. Academy of Health Sciences Force Integration Committee independent judgment (J1) results for subarea medical combat deficiency priorities.



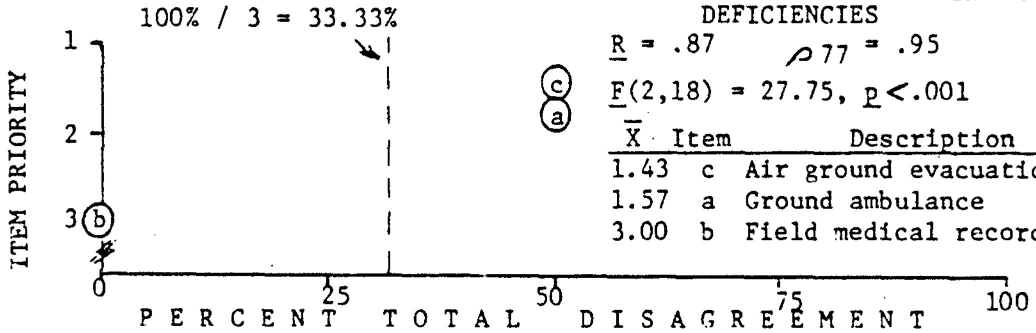
3. MEDICAL LOGISTICS DEFICIENCIES

$\underline{R} = .70$

$\rho_{77} = .82$

$\underline{F}(12,78) = 6.11$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.86	k	Med unit mobility wgt/cube
2.71	f	Medical resupply
5.57	e	Env protection (pat evac)
6.00	h	Refrigeration
6.00	d	Monitor vital signs in MOPP
6.00	c	Eye protection (frag radn)
6.71	g	Decontaminants (medical supplies)
7.71	j	Test measurement equipment
9.14	m	Covered storage (medical supplies)
9.14	i	Mat hdlg medical supplies
9.43	a	Lens fabrication
10.14	l	Dental field equipment
10.57	b	Field optometry equipment



4. PATIENT EVACUATION & REGULATING DEFICIENCIES

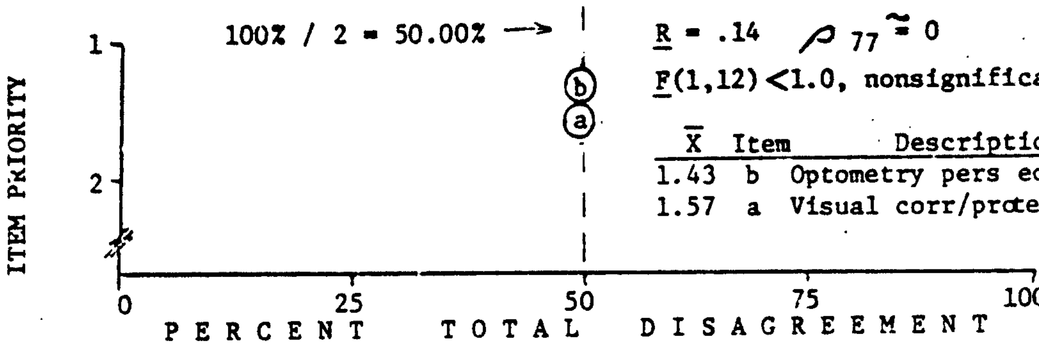
$\underline{R} = .87$ $\rho_{77} = .95$

$\underline{F}(2,18) = 27.75$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.43	c	Air ground evacuation veh
1.57	a	Ground ambulance
3.00	b	Field medical records

Figure 5. (continued)

5. OPTOMETRY/OPTICAL SERVICE DEFICIENCIES

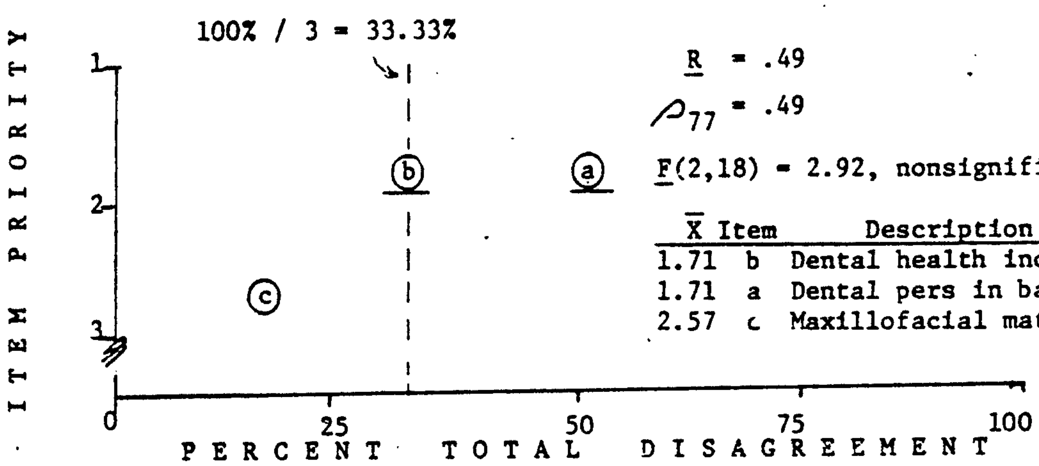


$\underline{R} = .14 \quad \rho_{77} \cong 0$

$\underline{F}(1,12) < 1.0$, nonsignificant

$\bar{X}$	Item	Description
1.43	b	Optometry pers equip ops
1.57	a	Visual corr/protect dev

6. DENTAL SERVICE DEFICIENCIES



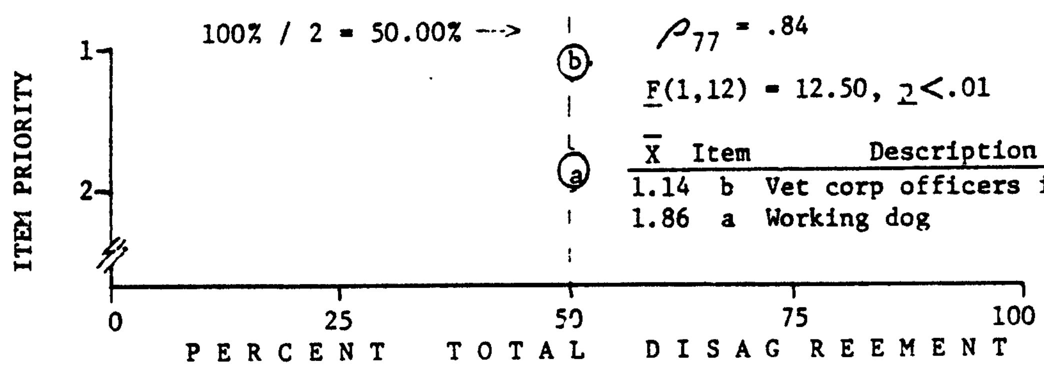
$\underline{R} = .49$

$\rho_{77} = .49$

$\underline{F}(2,18) = 2.92$, nonsignificant

$\bar{X}$	Item	Description
1.71	b	Dental health ind sold
1.71	a	Dental pers in battle
2.57	c	Maxillofacial materiel

7. VETERINARY SERVICE DEFICIENCIES



$\underline{R} = .71$

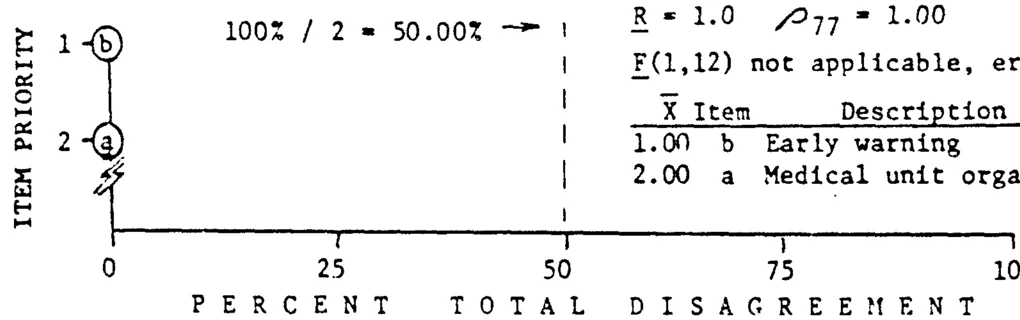
$\rho_{77} = .84$

$\underline{F}(1,12) = 12.50$, $\underline{p} < .01$

$\bar{X}$	Item	Description
1.14	b	Vet corp officers in battle
1.86	a	Working dog

Figure 5. (continued)

8. PREVENTIVE MEDICINE DEFICIENCIES

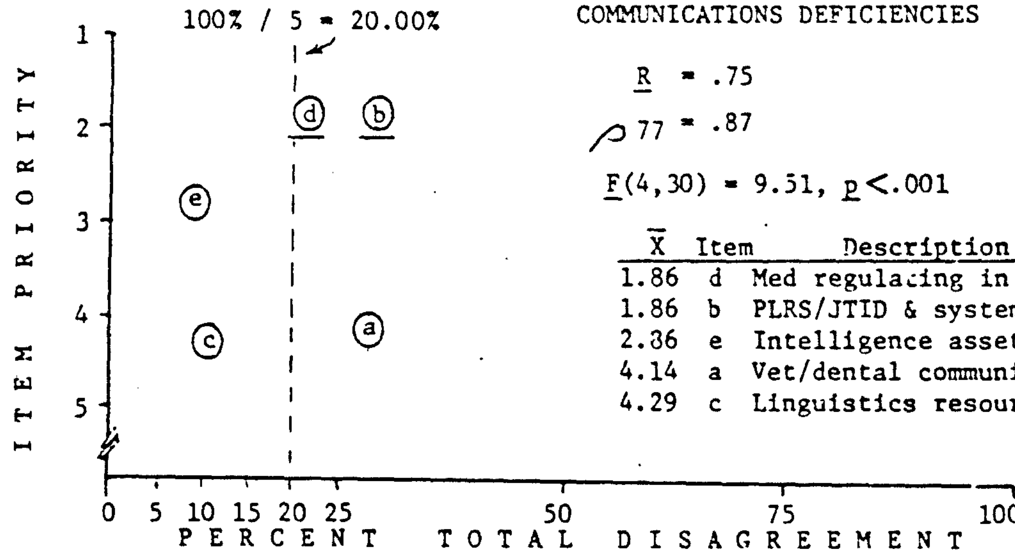


$\underline{R}$ = 1.0 ρ_{77} = 1.00

$\underline{F}(1,12)$ not applicable, error=0.0

$\bar{X}$	Item	Description
1.00	b	Early warning
2.00	a	Medical unit organization

9. MEDICAL COMMAND, CONTROL, AND COMMUNICATIONS DEFICIENCIES



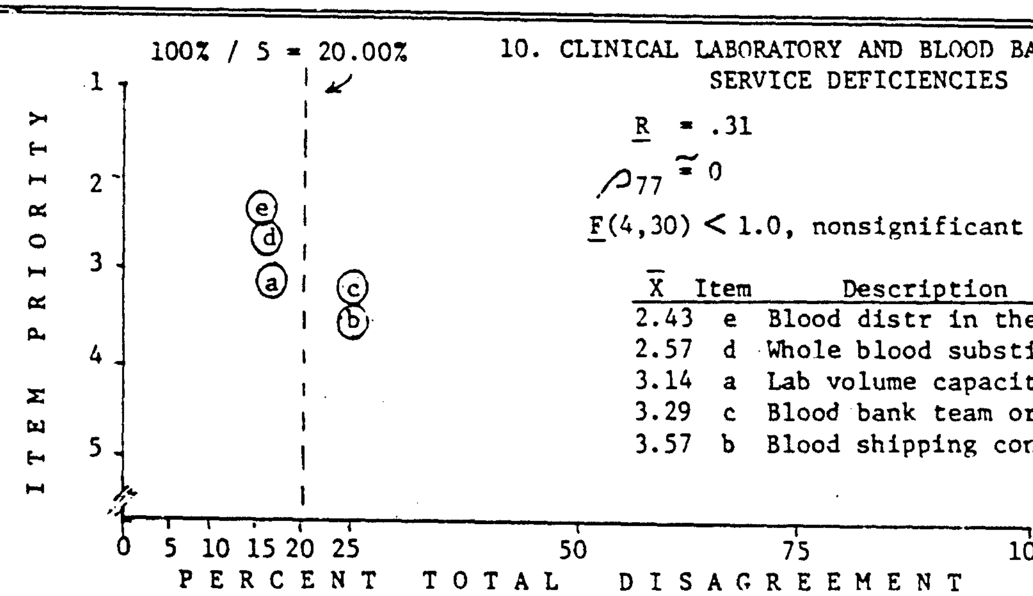
$\underline{R}$ = .75

ρ_{77} = .87

$\underline{F}(4,30)$ = 9.51, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.86	d	Med regulating in battle
1.86	b	PLRS/JTID & systems
2.36	e	Intelligence assets
4.14	a	Vet/dental communications
4.29	c	Linguistics resources

10. CLINICAL LABORATORY AND BLOOD BANK SERVICE DEFICIENCIES



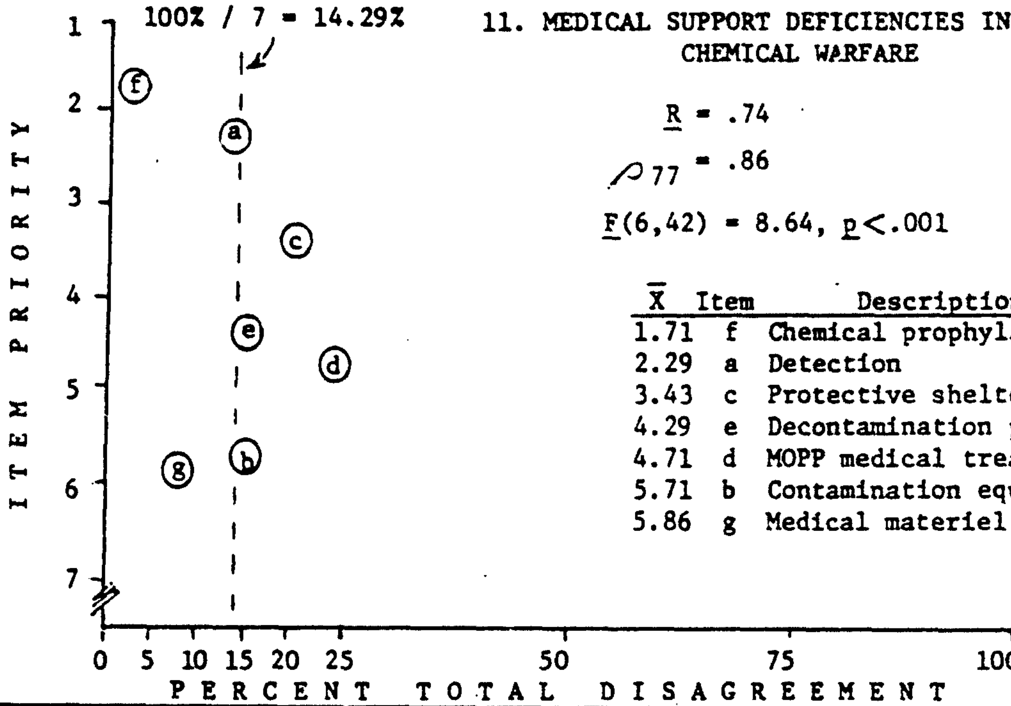
$\underline{R}$ = .31

$\rho_{77} \cong 0$

$\underline{F}(4,30) < 1.0$, nonsignificant

$\bar{X}$	Item	Description
2.43	e	Blood distr in theater
2.57	d	Whole blood substitutes
3.14	a	Lab volume capacity
3.29	c	Blood bank team org
3.57	b	Blood shipping containers

Figure 5. (continued)



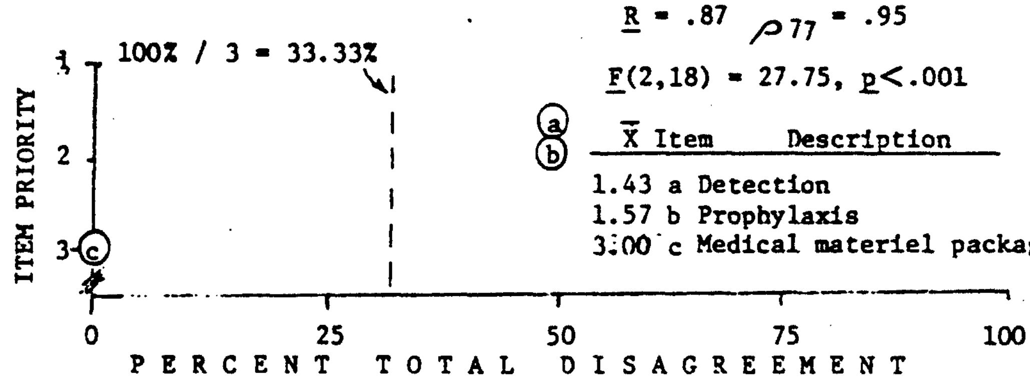
11. MEDICAL SUPPORT DEFICIENCIES IN CHEMICAL WARFARE

$\underline{R} = .74$

$\rho_{77} = .86$

$\underline{F}(6,42) = 8.64$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.71	f	Chemical prophylaxis
2.29	a	Detection
3.43	c	Protective shelter pat
4.29	e	Decontamination patients
4.71	d	MOPP medical treatment
5.71	b	Contamination equip sup
5.86	g	Medical materiel packaging

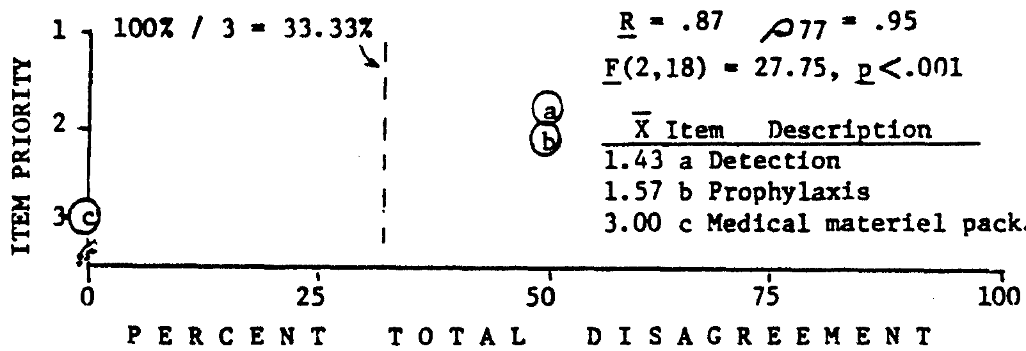


12. MEDICAL DEFICIENCIES IN A NUCLEAR ENVIRONMENT

$\underline{R} = .87$ $\rho_{77} = .95$

$\underline{F}(2,18) = 27.75$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.43	a	Detection
1.57	b	Prophylaxis
3.00	c	Medical materiel packaging



13. MEDICAL DEFICIENCIES IN A BIOLOGICAL ENVIRONMENT

$\underline{R} = .87$ $\rho_{77} = .95$

$\underline{F}(2,18) = 27.75$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.43	a	Detection
1.57	b	Prophylaxis
3.00	c	Medical materiel packaging

Figure 5. (continued)

Second, the experts' raw ranking profiles for Medical unit mobility (item k) and Medical resupply (item f) were 3 2 2 1 1 2 2 and 1 5 1 2 2 7 1 respectively. While item f was ranked first by three experts and item k received only two first place ranks, the average for f (2.71) falls below that of k (1.86). This finding is an example of the "frequent second-choice wins" phenomenon. The item average is calculated as the predicted item score produced by the group prediction equation. Since the equation considers all items and all experts, extreme values directly influence each item average. As shown on the graph, item k has less disagreement than item f because the item k raw ranks were less variable, i.e., contained ranks of first, second, and third place only.

Other decision measurement techniques, such as the method of paired comparisons, are also affected by the "frequent second-choice wins" phenomenon. For instance, if experts had each contributed their own item to a list, more likely than not each expert would rank his or her item as number one on his or her list. Because experts would disagree so strongly about the top priority, the item chosen second by most of the experts could result in the smallest item rank average and would likely result as the top priority item for the entire list.

For list 4, Patient Evacuation and Regulating, all experts unanimously ranked field medical records (item b) third on the list as reflected by zero disagreement. Air ground evacuation and Ground ambulance items were ranked first and second. Goodness-of-fit and internal consistency were acceptable for the item order displayed.

Optometry/Optical Service deficiencies consisted of two items. Three experts ranked item a (Visual correction and protection) first, while four members assigned item b (Optometry personnel equipment operation) as the first priority. List 5 was identified as one of the topics for group discussion because of the narrow difference between item means (a=1.57 versus b=1.43).

Dental Service deficiencies were also identified for group discussion because of the low goodness-of-fit (.49) and reliability (.49) indices. As shown in Figure 5, the averages for items pertaining to the dental health of individual soldiers (b) and performance of dental personnel in battle (a) were tied; however, item b exhibited somewhat less disagreement than item a (32.43% versus 51.35%).

Like the Optometry/Optical list, Veterinary Services also contained two items. Unlike the former list, the item means demonstrated a definitive and acceptable separation which was reflected by the results for R=.71, rho_{77}=.84, and the statistically significant F ratio.

Preventive Medicine items b (Early warning) and a (Medical unit organization) were ranked identically by all experts; this resulted in zero disagreement and maximal prediction and reliability. The F ratio is not applicable to such a situation since prediction errors cannot be estimated for perfect agreement.

Judgments of Medical Command, Control, and Communication deficiencies resulted in a moderate goodness-of-fit (.75) and a fairly good level of reliability (.87). Tied rank averages for item d (Medical regulating in battle) and b (Systems) were separated by 6.48 percentage points of disagreement (22.22 versus 28.70%) which placed the Medical regulating item as the top priority on the list.

Judgments of list 10, Clinical lab and blood bank services, indicated that some experts ranked items in the opposite direction from other experts. As a result the item averages tended to cluster to the middle of the priority dimension. Although items could be rank ordered based upon the minor differences among means, the attenuated levels associated with the summary statistics indicated that these items merited group discussion and revision.

Chemical warfare results aligned items in a fairly clear order ranging from Chemical prophylaxis measures (f) down to Medical materiel packaging deficiencies (g). Prediction (.74) and reliability (.86) results were acceptable as was the significance test for item mean differences.

The last two lists concerned Nuclear and Biological Warfare and contained the same three items. Experts ranked both lists in a similar fashion, and unanimously placed Medical materiel packaging (c) as the bottom priority on each list. While Detection (a) and Prophylaxis (b) items were close in importance, the reliability measures (.95) indicated that the judgments were stable and acceptable.

FIC - Revised Group Judgments (J2) of Medical Combat Subarea Priorities

After the experts had reviewed the results of the independent judgments, each of the three disputed lists were discussed. As a result, lists for Optometry/Optical, Dental, and Clinical Laboratory/Blood Bank Service deficiencies were reordered as shown at the bottom of Table 4. Interactive group discussion was not limited to reprioritization of items within lists. Through further discussion, members decided to rename list 2 from Force Structure to Medical Resources. In addition, by unanimous vote, two of the 68 items were deleted, and two others were moved from one list to another. A few minor wording changes also were made to some item descriptions for purposes of clarification (compare Appendices I and II). The revised group judgments (J2) were recorded and served as the stimulus input items for the independent round of judgments (J1) made by the AMEDD General Officer board that was held a few weeks later. It is interesting to note that these changes would not have emerged if analyses had been limited to nominal group decisions.

AMEDD General Officer Board - Independent Judgments (J1) of Medical Combat Subarea Priorities

Table 5 presents a summary of the independent judgments rendered by the AMEDD General Officer Board. Globally, rank orders of the 66 items appeared to be similar to the orders obtained from committee members (Table 4). Within the good to excellent range of prediction, two AMEDD lists fell at R=.80 and above--lists (4) Evacuation and Regulating and (12) Nuclear

Table 5

Summary Results for Mission Area Analysis Medical Combat Deficiencies

Rank Data From AMEDD General Officer Board
J1 Independent Judgments

Major Deficiency List	Item rank order (most to least important) 1 2 3 4 5 6 7 8 9 10 11 12 13	N Items	Goodness-of-fit R	Reliability ρ_{77}	Item Rank Mean Differences F [a]
1. Medical Treatment	b c e $\underline{a}$ $\underline{d}$ f h g i	9	.68	.81	$F(8,54) = 5.78$***
2. Medical Resources	a c h j b i e d f g	10	.68	.81	$F(9,60) = 5.74$***
3. Medical Logistics	e c f j m k $\underline{i}$ $\underline{h}$ d $\underline{g}$ $\underline{a}$ l b	13	.57	.65	$F(12,78) = 3.06$***
4. Evacuation/Regulating	c a b	3	.89	.96	$F(2,18) = 35.10$***
5. Optometry/Optical	a b	2	.71	.84	$F(1,12) = 12.50$**
6. Dental Services	b c a	3	.57	.66	$F(2,18) = 4.36$*
7. Veterinary Services	b a	2	.14	$\simeq 0$	$F(1,12) = .25$, n/s
8. Preventive Medicine	b a	2	.14	$\simeq 0$	$F(1,12) = .25$, n/s
9. Command, Ctrl, & Comm.	a c d b	4	.68	.81	$F(3,24) = 6.85$**
10. Clinical Lab/Blood Bank	d e $\underline{a}$ $\underline{c}$ b	5	.36	$\simeq 0$	$F(4,30) = 1.27$, n/s
11. Chemical Warfare	f a e d b c g	7	.67	.79	$F(6,42) = 5.57$***
12. Nuclear Environment	b a c	3	.80	.90	$F(2,18) = 15.50$***
13. Biological Warfare	$\underline{a}$ $\underline{b}$ c	3	.74	.86	$F(2,18) = 11.05$***
Order of Major Deficiencies	**Deficiency rank order (most to least important) 1 2 3 4 5 6 7 8 9 10 11 12 13**	**N Lists**	**Goodness-of-fit R**	**Reliability ρ_{77}**	**List Rank Mean Differences F**
Overall	1 2 4 11 3 9 8 13 12 10 6 7 5	13	.71	.84	$F(12,78) = 6.60$***

Note: Underlined items indicate adjacent tied item rank averages. Ties were broken by listing the item with the least disagreement (smallest proportion of squared residual) first.
[a] n/s = non-significant, *** $p < .001$, ** $p < .01$, * $p < .05$

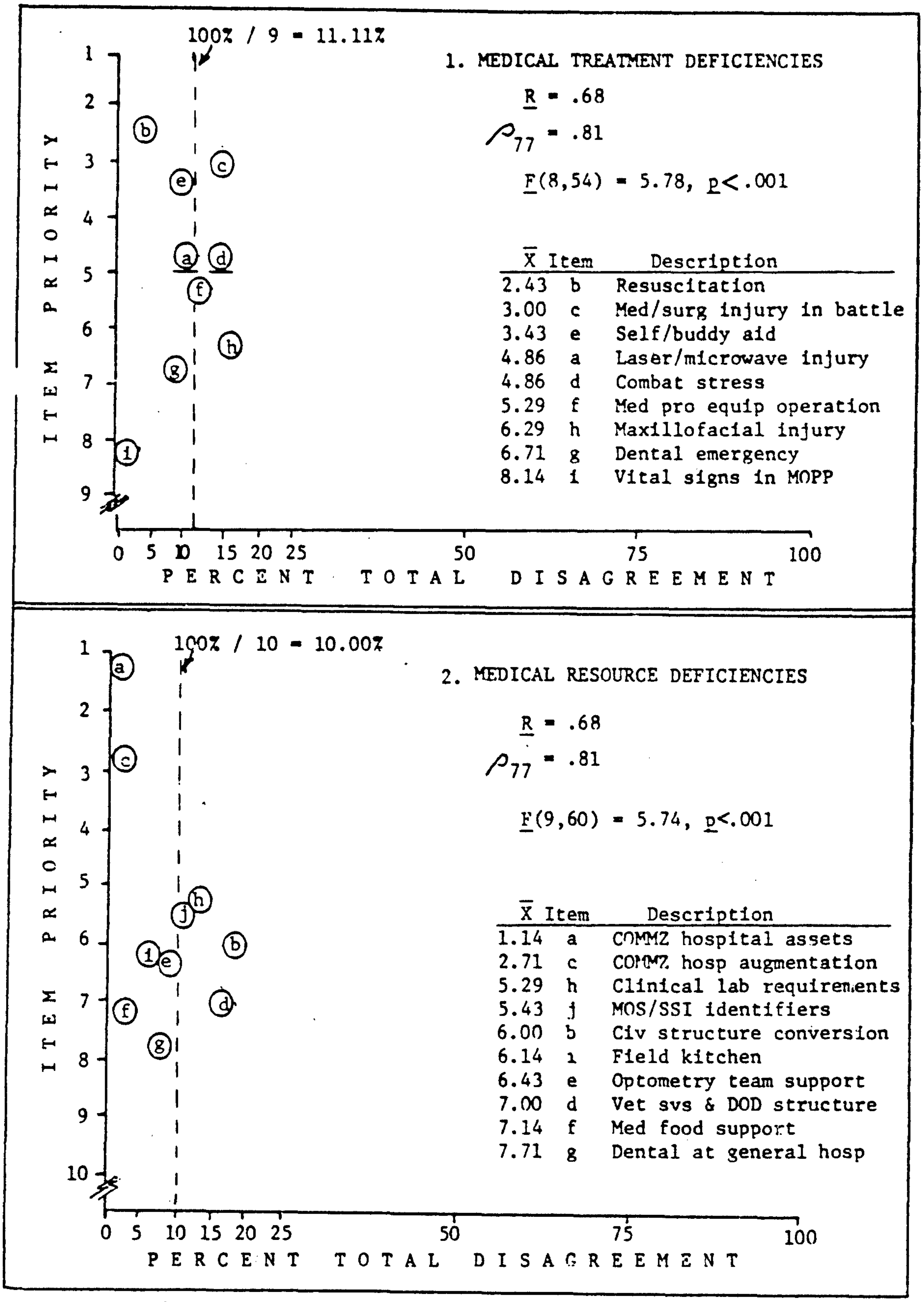
environment. Fair to good prediction results ($\underline{R}$=.60 to .80) were associated with six lists: (1) Medical Treatment, (2) Medical Resources (formerly Force Structure), (5) Optometry/Optical, (9) Medical Command, Control, and Communication, (11) Chemical Warfare, and (13) Biological Warfare. Compared with the results from the FIC experts (Table 4) and the above AMEDD lists--with the exception of list 5--all lists fell within the range of fair to excellent prediction for both panels. Prediction results falling below .60 for AMEDD experts included the remaining five lists: (3) Medical Logistics, (6) Dental, (7) Veterinary, (8) Preventive Medicine, and (10) Clinical Lab/Blood Bank. These findings indicated that five areas of disagreement existed among AMEDD experts that required interactive revised group actions.

Acceptable J1 reliabilities (over .80) for AMEDD judgments were obtained for all lists except 3, 6, 7, 8, and 10. Two of these lists, 6 and 10, had previously been disagreed upon by FIC members. Significance tests further indicated that mean ranks among lists 7, 8, and 10 were somewhat unstable. One very striking difference between the panels of experts was observed for list 8, Preventive Medicine. Prediction and reliability estimates for this list were extremely high for the committee judgments (1.0), whereas the AMEDD judgment prediction ($\underline{R}$=.14) and corresponding reliability (=0.0) were quite low.

In summary, the level of prediction appeared to be slightly higher for the first panel of experts (ranging from .70 to 1.0) than for the second panel (ranging from .67 to .89). Likewise, five of the ten acceptable reliability estimates for the first panel were .91 or better as opposed to only two of the eight acceptable estimates from the second panel. While prediction and reliability findings were useful for both panels in the identification of independent judgment areas that required discussion, the FIC member decisions appeared to be more homogeneous than those of the AMEDD board. This finding may be interpreted as a reflection of the regular meetings attended by the FIC experts within the same organization (AHS) or perhaps of the higher similarity of background characteristics of the committee, e.g., TOE and combat experience (Table 1).

Figure 6 displays the separate graphic analyses conducted for the AMEDD General Officer Board J1 decisions. The standard graphic display for Medical treatment shows subarea item means plotted vertically by priority with item disagreement plotted on the horizontal axis. Of the nine items (b), Resuscitation, and (c), Medical and surgical treatment of injuries in battle, were the top priorities followed by (e), Self and buddy aid. Item averages for (a), Laser/microwave injury, and (d), Combat stress, were tied. Item (a) was ranked fourth and (d) fifth based upon the percent of disagreement. Goodness-of-fit and reliability were adequate.

Leading Medical Resource deficiencies consisted of COMMZ hospital items (a and c). The top priority, item a, was ranked number one by all but one expert who ranked it second to item c. The multiple correlation (.68) and reliability (.81) associated with these judgments were adequate, although the remaining eight items in the lower range were clustered from priorities 5 to 8. Overall, however, significant differences were found among item rank means.



1. MEDICAL TREATMENT DEFICIENCIES

$\underline{R} = .68$

$\rho_{77} = .81$

$\underline{F}(8,54) = 5.78$, $\underline{p} < .001$

$\bar{X}$	Item	Description
2.43	b	Resuscitation
3.00	c	Med/surg injury in battle
3.43	e	Self/buddy aid
4.86	a	Laser/microwave injury
4.86	d	Combat stress
5.29	f	Med pro equip operation
6.29	h	Maxillofacial injury
6.71	g	Dental emergency
8.14	i	Vital signs in MOPP

2. MEDICAL RESOURCE DEFICIENCIES

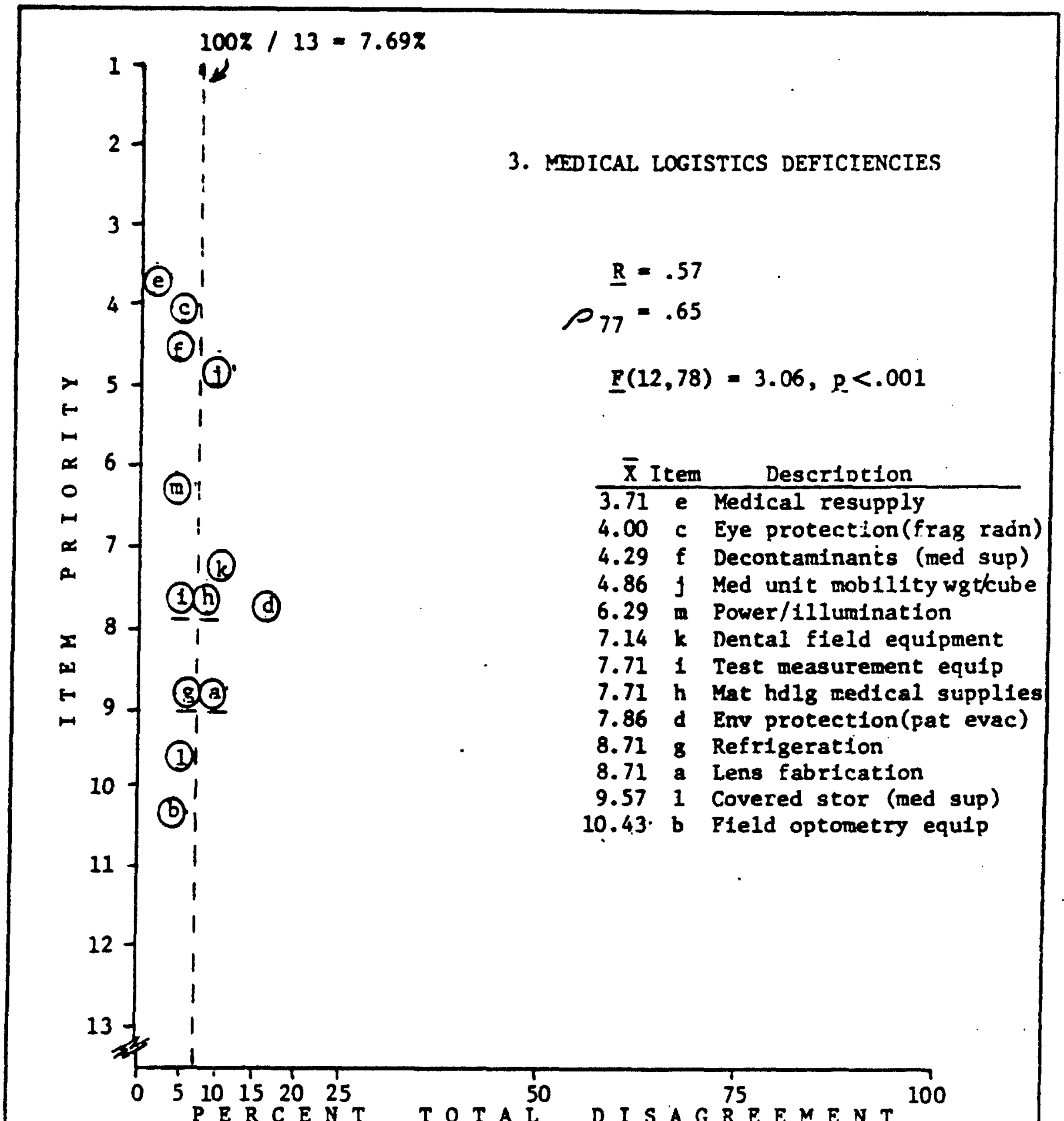
$\underline{R} = .68$

$\rho_{77} = .81$

$\underline{F}(9,60) = 5.74$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.14	a	COMMZ hospital assets
2.71	c	COMMZ hosp augmentation
5.29	h	Clinical lab requirements
5.43	j	MOS/SSI identifiers
6.00	b	Civ structure conversion
6.14	i	Field kitchen
6.43	e	Optometry team support
7.00	d	Vet svs & DOD structure
7.14	f	Med food support
7.71	g	Dental at general hosp

Figure 6. AMEDD General Officer Board independent judgment (J1) results for subarea medical combat deficiency priorities.



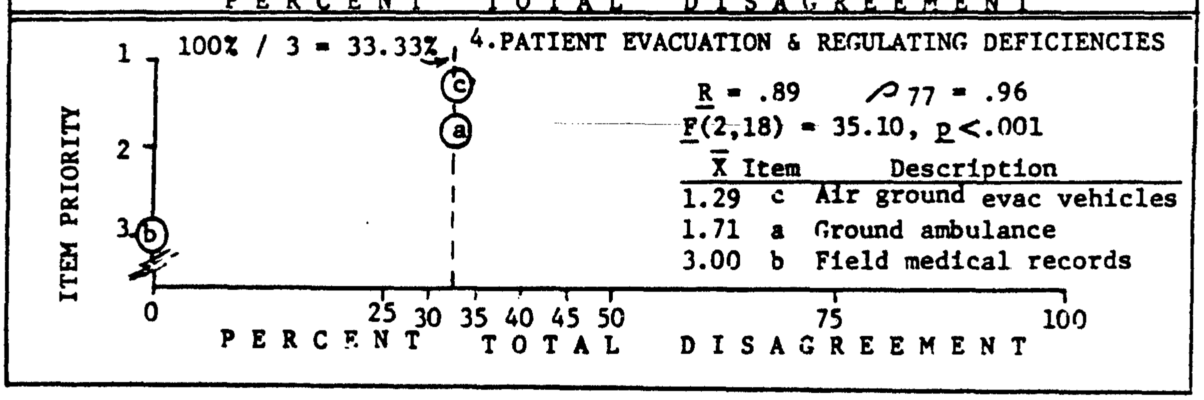
3. MEDICAL LOGISTICS DEFICIENCIES

$\underline{R} = .57$

$\rho_{77} = .65$

$\underline{F}(12,78) = 3.06$, $\underline{p} < .001$

$\bar{X}$	Item	Description
3.71	e	Medical resupply
4.00	c	Eye protection(frag radn)
4.29	f	Decontaminants (med sup)
4.86	j	Med unit mobility wgt/cube
6.29	m	Power/illumination
7.14	k	Dental field equipment
7.71	i	Test measurement equip
7.71	h	Mat hdlg medical supplies
7.86	d	Env protection(pat evac)
8.71	g	Refrigeration
8.71	a	Lens fabrication
9.57	l	Covered stor (med sup)
10.43	b	Field optometry equip



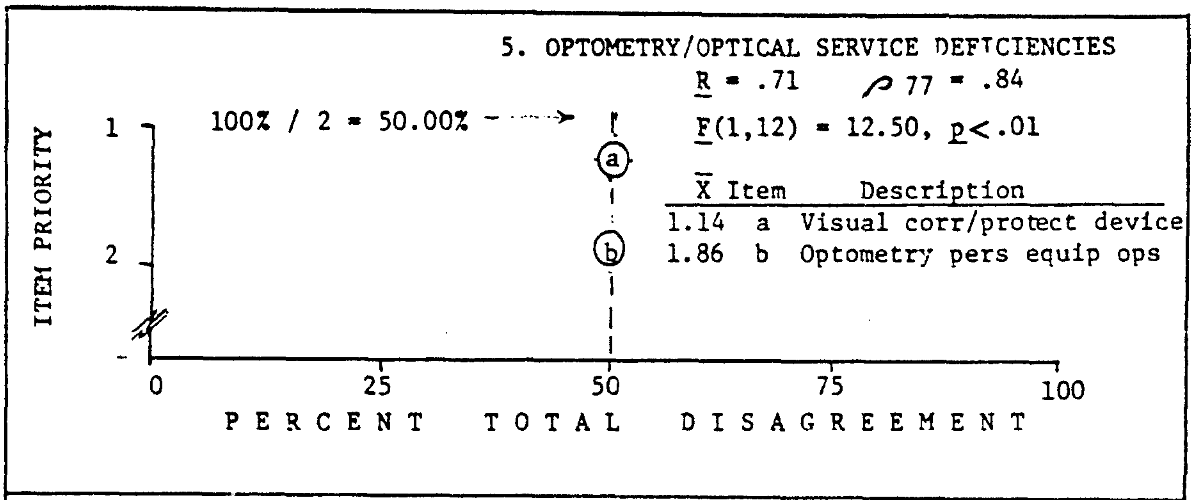
4. PATIENT EVACUATION & REGULATING DEFICIENCIES

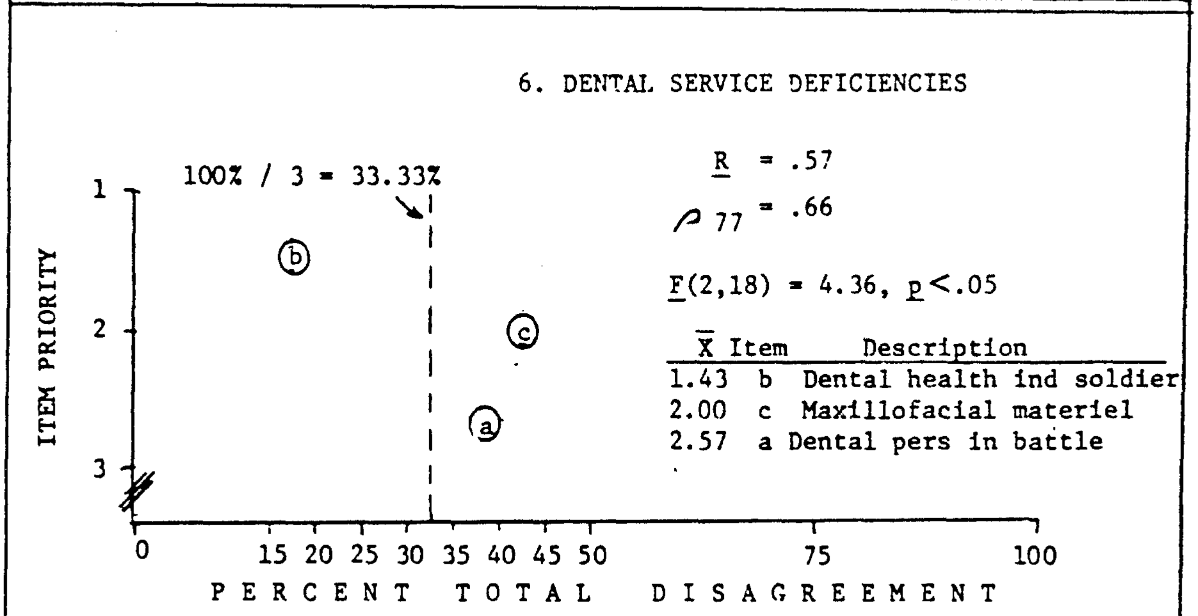
$\underline{R} = .89$ $\rho_{77} = .96$

$\underline{F}(2,18) = 35.10$, $\underline{p} < .001$

$\bar{X}$	Item	Description
1.29	c	Air ground evac vehicles
1.71	a	Ground ambulance
3.00	b	Field medical records

Figure 6. (continued)





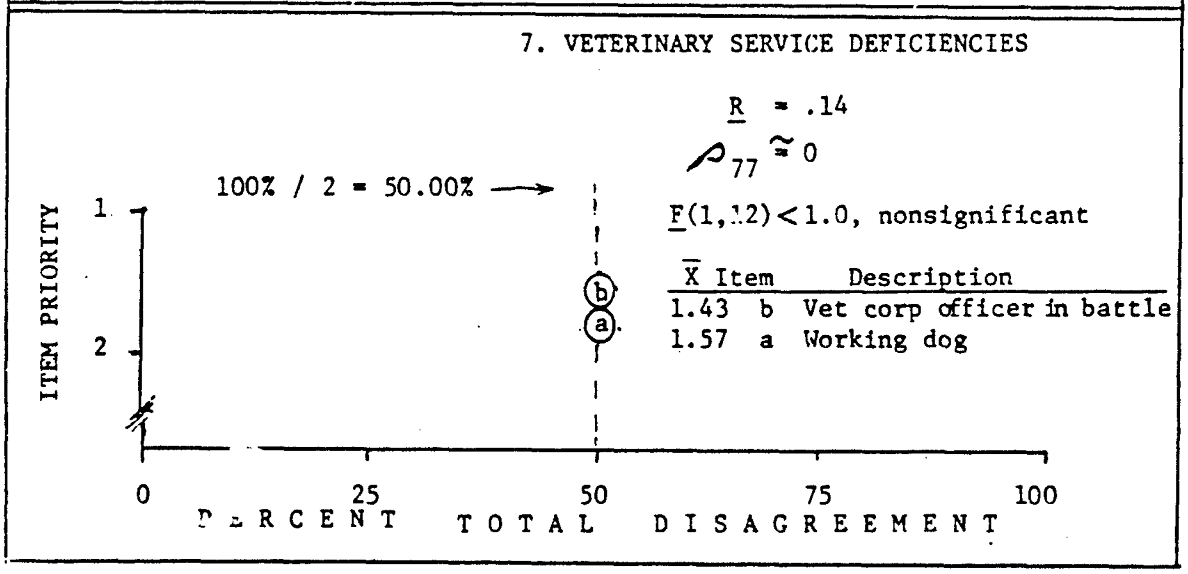
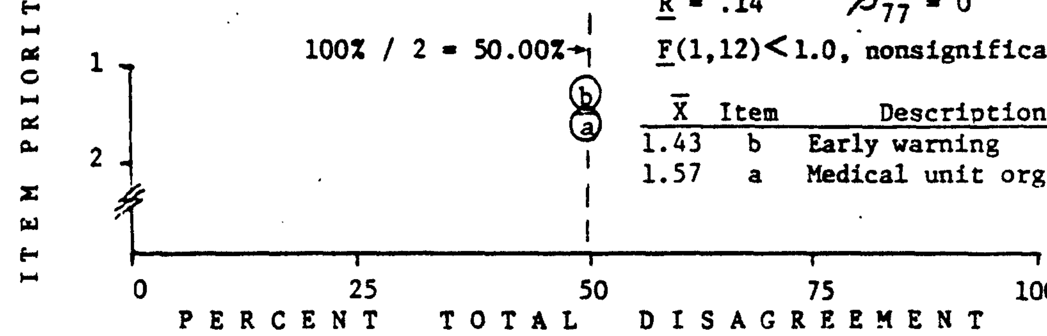


Figure 6. (continued)

8. PREVENTIVE MEDICINE DEFICIENCIES

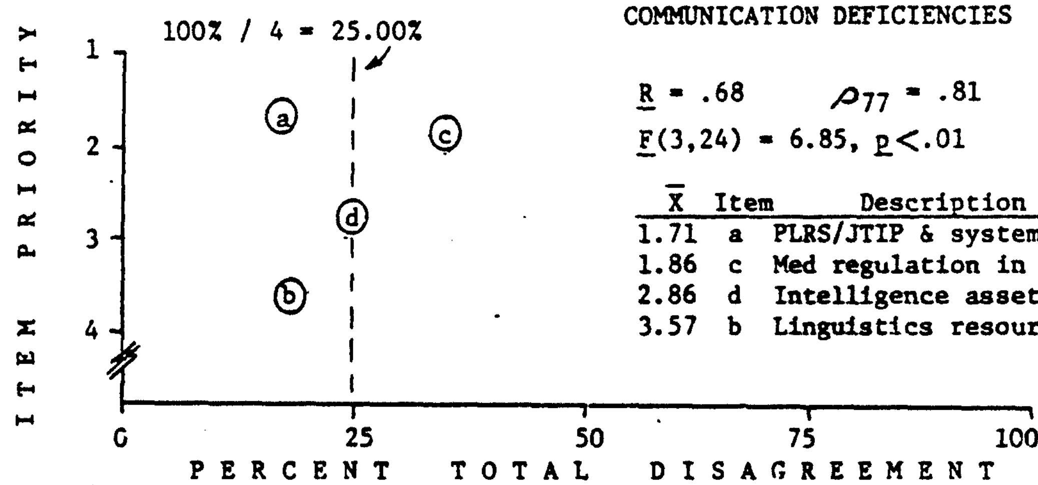


$\underline{R} = .14$ $\rho_{77} \cong 0$

$\underline{F}(1,12) < 1.0$, nonsignificant

$\bar{X}$	Item	Description
1.43	b	Early warning
1.57	a	Medical unit org

9. MEDICAL COMMAND, CONTROL, AND COMMUNICATION DEFICIENCIES

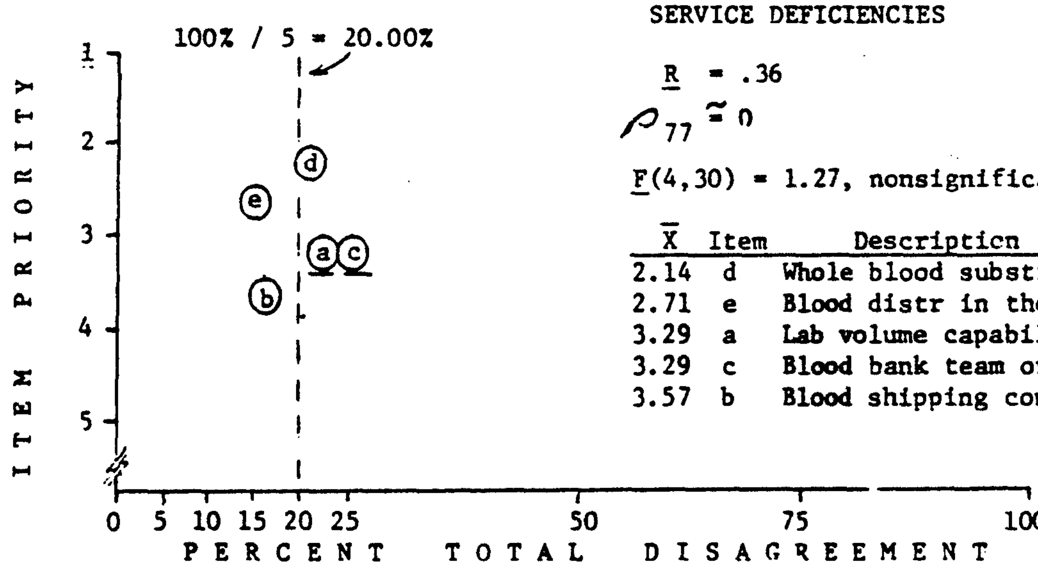


$\underline{R} = .68$ $\rho_{77} = .81$

$\underline{F}(3,24) = 6.85$, $\underline{p} < .01$

$\bar{X}$	Item	Description
1.71	a	PLRS/JTIP & systems
1.86	c	Med regulation in battle
2.86	d	Intelligence assets
3.57	b	Linguistics resources

10. CLINICAL LABORATORY AND BLOOD BANK SERVICE DEFICIENCIES



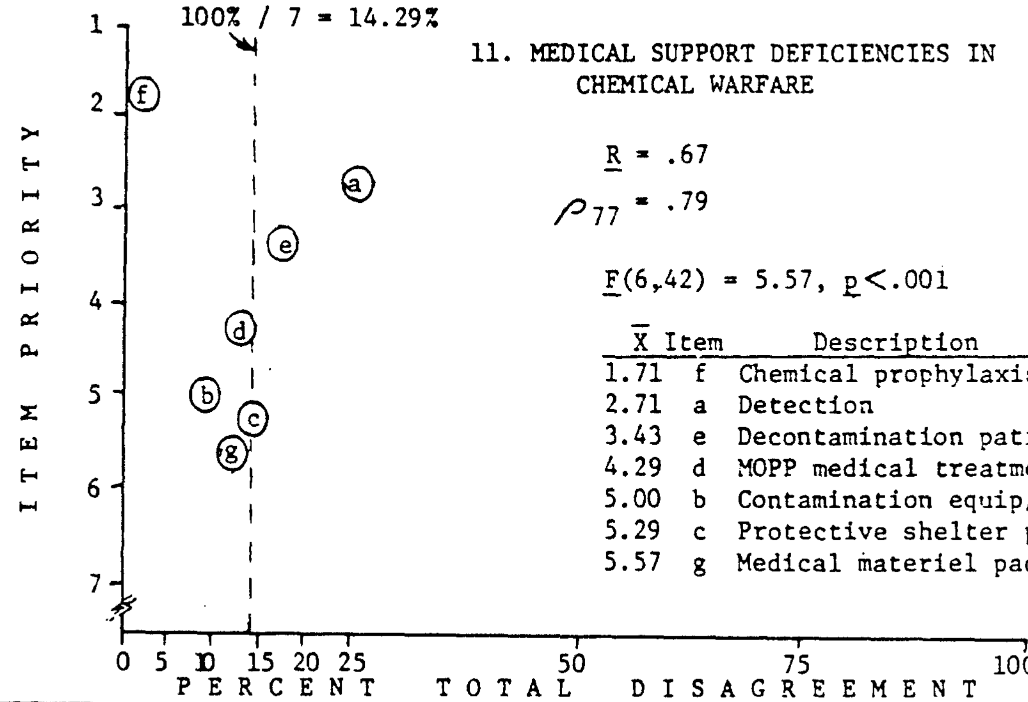
$\underline{R} = .36$

$\rho_{77} \cong 0$

$\underline{F}(4,30) = 1.27$, nonsignificant

$\bar{X}$	Item	Description
2.14	d	Whole blood substitutes
2.71	e	Blood distr in theater
3.29	a	Lab volume capability
3.29	c	Blood bank team org
3.57	b	Blood shipping containers

Figure 6. (continued)



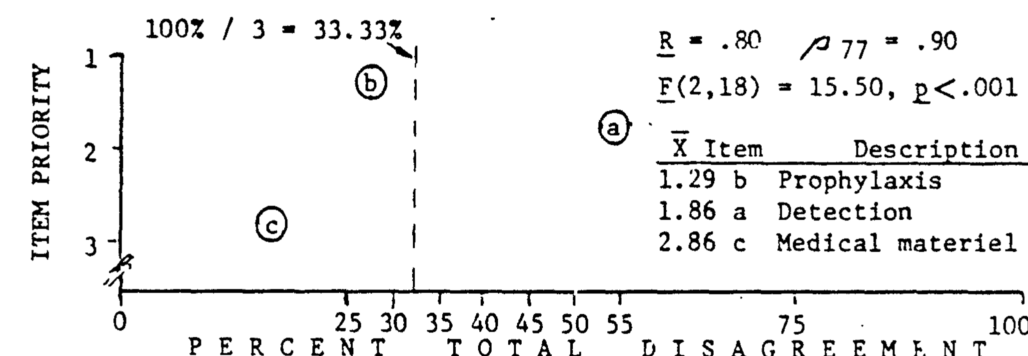
11. MEDICAL SUPPORT DEFICIENCIES IN CHEMICAL WARFARE

$\underline{R} = .67$

$\rho_{77} = .79$

$\underline{F}(6,42) = 5.57,\ \underline{p} < .001$

$\bar{X}$	Item	Description
1.71	f	Chemical prophylaxis
2.71	a	Detection
3.43	e	Decontamination patients
4.29	d	MOPP medical treatment
5.00	b	Contamination equip/supplies
5.29	c	Protective shelter patients
5.57	g	Medical materiel packaging

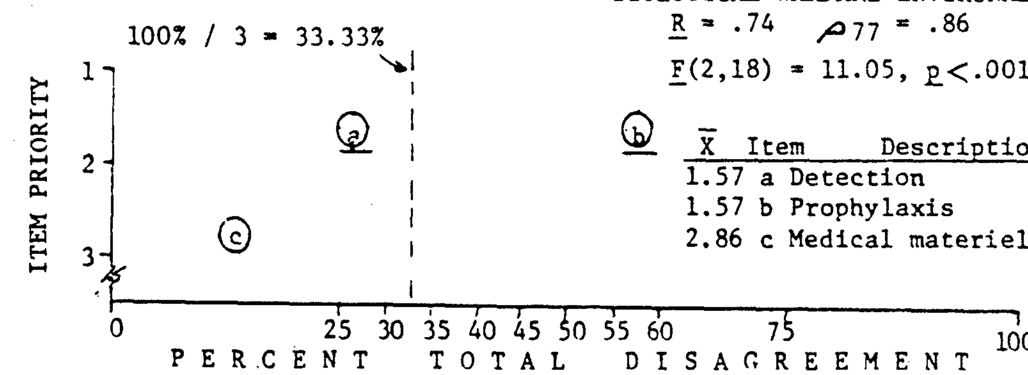


12. MEDICAL DEFICIENCIES IN A NUCLEAR ENVIRONMENT

$\underline{R} = .80 \quad \rho_{77} = .90$

$\underline{F}(2,18) = 15.50,\ \underline{p} < .001$

$\bar{X}$	Item	Description
1.29	b	Prophylaxis
1.86	a	Detection
2.86	c	Medical materiel pkg



13. MEDICAL DEFICIENCIES IN A BIOLOGICAL WARFARE ENVIRONMENT

$\underline{R} = .74 \quad \rho_{77} = .86$

$\underline{F}(2,18) = 11.05,\ \underline{p} < .001$

$\bar{X}$	Item	Description
1.57	a	Detection
1.57	b	Prophylaxis
2.86	c	Medical materiel pkg

Figure 6. (continued)

Medical Logistics deficiency judgments (list 3) resulted in an attenuated level of prediction (.57) and a very modest level of reliability (.65). Items tended to cluster between the third and tenth priority positions which indicated the need for group discussion since top and bottom priorities were not clearly defined.

For list 4, Patient evacuation and regulating, all experts again unanimously ranked Field Medical records (item b) third on the list, as reflected by zero disagreement. Consistent with the FIC rankings, Air ground evacuation and Ground ambulance items were ranked first and second. Goodness-of-fit and internal consistency were quite high for the item order displayed.

Optometry/Optical service deficiencies consisted of two items. Unlike FIC judgments, however, item (a), Visual correction/protection devices, was clearly separated from (b) Optometry personnel equipment operations. Multiple correlation (.71) and reliability (.84) coefficients were adequate, and a statistically significant difference was detected between item averages.

Dental service deficiencies were also indentified for group discussion because of the low goodness-of-fit (.57) and reliability (.66) indices. Of the three items, the top priority item b (Dental health of individual soldiers) appeared to be the most stable since it exhibited less disagreement than the other items.

The priority placement of Veterinary service items and Preventive medicine items appeared to be disputed. Very low prediction and reliability levels identified these two lists for subsequent group discussion.

Judgments of Medical Command, Control, and Communication deficiencies resulted in a fair goodness-of-fit (.68) and an acceptable level of interater agreement (.81). Item (a) PLRS/JTID and Systems deficiencies led item (c) Medical regulating in battle by a narrow margin.

Judgments of list 10, Clinical lab and blood bank services, indicated that some experts ranked items in the opposite direction from other experts. This was also the case for FIC judgments. As a result, item averages tended to cluster between 2.14 and 3.57. The attenuated levels associated with the summary statistics indicated that these item judgments required group discussion and revision.

Goodness-of-fit for list 11, Chemical Warfare deficiencies, was adequate (.67) although reliability was marginal (.79). The pattern of results clearly aligned item (f) Chemical prophylaxis as the top priority, while items (c), Protective shelter for patients, and (g), Medical materiel packaging, were not clearly separated as items of lesser importance.

The last two lists concerned Nuclear and Biological warfare and contained the same three items. Prediction and reliability results were adequate, and item (c), Medical materiel packaging, was ranked last on both lists. Item (b), Prophylaxis, was clearly the first prority for Nuclear deficiencies, but was reversed with item (a), Detection for the Biological warfare list, to break the resultant tie (item rank means = 1.57).

Comparison of FIC J1-J2 Item Ranks with AMEDD General Officer Board J1 Item Ranks

Although levels of prediction, reliability, and item rank mean differences were similar among both groups of experts, the specific rank orders of items were not necessarily the same. To compare specific item ranks across groups, a series of Spearman rank difference correlations were computed for deficiency lists. Summary results are presented in Table 6.

Table 6

Summary of Comparisons of J1-J2 FIC Item Ranks With

The AMEDD General Officer Board J1 Item Ranks

Major Deficiency Area[a]	Spearman Rank Difference Corr.[b]	Number of Matching Items	d.f.
Patient Evacuation & Regulating	1.00	3	1
[a]Optometry/Optical Service	1.00	2	-
[a]Dental Services	1.00	3	1
Veterinary Services	1.00	2	-
Preventive Medicine	1.00	2	-
Biological Warfare Environment	1.00	3	2
Medical Resources (Force Structure)	.99**	10	8
Chemical Warfare	.79*	7	5
Medical Logistics	.55*	12	10
Medical Command, Control, & Communication	.80 n/s	4	2
[a]Clinical Laboratory/Blood Bank	.80 n/s	5	3
Medical Treatment	.57 n/s	8	6
Nuclear Environment	.50 n/s	3	1
	Total	64	

[a]Indicates comparison based on revised group judgment (J2) from FIC experts.
[b]Level of statistical significance, **$p<.01$, *$p<.05$, n/s = nonsignificant.

Six of the 13 major deficiency lists were prioritized identically by both expert panels. These six lists encompassed 15 of the 64 (23.44%)

possible direct subarea comparisons. An additional 29 items from three other lists achieved an acceptable level of statistical significance. This finding indicated that both boards ranked items in a similar fashion. For the remaining 20 items the level of similarity appeared attenuated (.50 - .80), but in a positive direction. Only one major deficiency area, Optometry/Optical Services, was ranked in reverse order by the two boards during the J1 condition. However, the order for Optometry/Optical items was revised by the FIC experts during the J2 group discussion. The absence of any negative correlations indicated that there were few substantive differences in the priority of items obtained from the two groups of experts. The similarity of placement for items assured that each of the subarea items had been considered carefully by the 14 experts and that very little disagreement existed as to the priority of the items.

Table 7 provides a detailed comparison of the specific item ranks between judgments made by the two boards of experts. When lists did not exactly match, due to the revised J2 decisions made by the FIC experts, the mismatched items are shown at the bottom of the list with the rank that the particular item originally received. Ranks of items below mismatched items were renumbered sequentially to allow a comparison between the two prioritized lists. Revised group judgments (J2) from the FIC experts are shown in parentheses next to the original J1 decisions. <u>Rho</u> coefficients are indicated for each comparison, including initial J1 decisions and revised group decisions (J2) where appropriate. In only one instance (list 10 Clinical Lab/Blood Bank) did the revised group judgment decrease the similarity between the groups' ranks.

<u>AMEDD General Officer Board J1-J2 for Major Medical Combat Deficiencies</u>

After items within the major deficiency lists were prioritized, General Officer Board members rank ordered the 13 lists from most to least important (shown at the bottom of Table 5). Figure 7 presents the independent J1 judgment results of the Board for the 13 major areas. Deficiency lists which were disagreed upon and required group discussion are indicated by an asterisk (*) Goodness-of-fit for the group equation was fair to good (.71). Internal consistency among the experts' judgments was also adequate (.84). The overall pattern of lists along the priority dimension was well distributed as shown pictorially in the graph and statistically by the significance of the <u>F</u> ratio. Feedback information from the "list of lists" and from the individual subarea priorities was used by the experts to arrive at a final revised group decision (J2).

<u>List of lists - final revisions.</u> Figure 8 displays the revised group judgments of the AMEDD General Officer Board. After discussion of lists 3, 6, 7, 8, and 10, the group decided to delete five major areas (Medical Logistics, Clinical Lab/Blood Bank, Dental, Veterinary, and Optometry/Optical Services). Subarea items from those five major areas were merged into the remaining eight major lists. (See the summary of revisions at the bottom of Fig. 8.) In addition to deletions and item movement, the remaining major areas were renamed as shown. As a result of further discussion, the group unanimously placed Casualty Care/Treatment as the top-most priority and placed Casualty Prevention as the second-most priority.

Table 7

Comparison of FIC J1-J2 Specific Item Ranks with AMEDD

General Officer Board J1 Item Ranks

Item	Rank Order FIC	Rank Order AMEDD	Spearman Rank Difference Correlation[a]
1. Medical Treatment Deficiencies			
Resuscitation	4	1	
Med/surg in battle	2	2	
Self/buddy aid	1	3	
Laser/mircowave injury	7	4	rho (6 d.f.) = .57,n/s
Combat stress	5	5	
Med pro equip operation	3	6	
Maxillofacial	8	7	
Dental/vet emergency	6	8	
(Monitor vital sign/MOPP)	-	(9)	
2. Medical Resource Deficiencies (was Force Structure)			
COMMZ hospital assets	1	1	
COMMZ hospital augmentation	2	2	
Clinical lab requirements	4	3	
MOS/SSI identifiers	3	4	
Civ structure conversion	5	5	
Field kitchen	6	6	
Optometry teams support	7	7	
Vet svcs & DOD structure	8	8	
Med food support	9	9	rho (8 d.f.) = .99**
Dental at general hospitals	10	10	
(Field treatment combat stress)	(2)	-	
(Power & illumination)	(4)	-	
3. Medical Logistics Deficiencies			
Med resupply	2	1	
Eye protection (frag radn)	5	2	
Decontaminants (med sup)	6	3	
Med unit mobility wt/cube	1	4	
Dental field equip	11	5	
Test, meas, equip	7	6	
Mat hdlg med sup	9	7	
Env protection (pat in evac)	3	8	
Refrigeration	4	9	
Lens fabrication	10	10	rho (10 d.f.) = .55*
Covered stor (med sup)	8	11	
Field optometry equip	12	12	
(Monitor vital signs/MOPP)	(5)	-	
(Power & illumination)	-	(5)	

a ** $p < .01$, * $p < .05$, n/s = nonsignificant

Table 7 (continued)

Item	Rank Order FIC	Rank Order AMEDD	Spearman Rank Difference Correlation[a]
4. Patient Evacuation & Regulating Deficiencies			
Air ground evac vehicles	1	1	
Ground ambulance	2	2	
Field medical records	3	3	rho (1 d.f.) = 1.00
5. Optometry/Optical Service Deficiencies			
Visual correction/protect device	2(1)	1	Initial: rho = -1.00
Optometry pers op of equip	1(2)	2	Revised: rho = 1.00
NOTE: FIC J2 revised judgment reversed order of 2nd and 3rd items			
6. Dental Service Deficiencies			
Dental health of indiv soldier	1	1	Initial: rho (1 d.f.) = .50, n/s
Maxillofacial materiel	3(2)	2	
Dental pers in battle	2(3)	3	Revised: rho (1 d.f.) = 1.00
NOTE: FIC J2 revised judgment reversed order of 2nd and 3rd items			
7. Veterinary Service Deficiencies			
Vet Corp officers in battle	1	1	rho = 1.00
Working dog	2	2	
8. Preventive Medicine Deficiencies			
Early warning	1	1	rho = 1.00
Med unit org	2	2	
9. Medical Command, Control, & Communication Deficiencies			
PLRS/JTID & systems	2	1	
Med regulating in battle	1	2	
Intelligence assets	3	3	rho (2 d.f.) =.80, n/s
Linguistics resources	4	4	
Vet/dental communications	(4)		
10. Clinical Lab/Blood Bank Services Deficiencies			
Whole blood substitutes	2	1	
Blood distri in theater	1	2	Initial: rho (3 d.f) = .90*
Lab volume capability	3	3	
Blood bank team org	4(5)	4	Revised: rho (3 d.f.) = .80, n/s
Blood shipping containers	5(4)	5	
NOTE: FIC J2 revised judgment reversed order of 4th and 5th items			

[a] $*p < .05$, n/s = nonsignificant

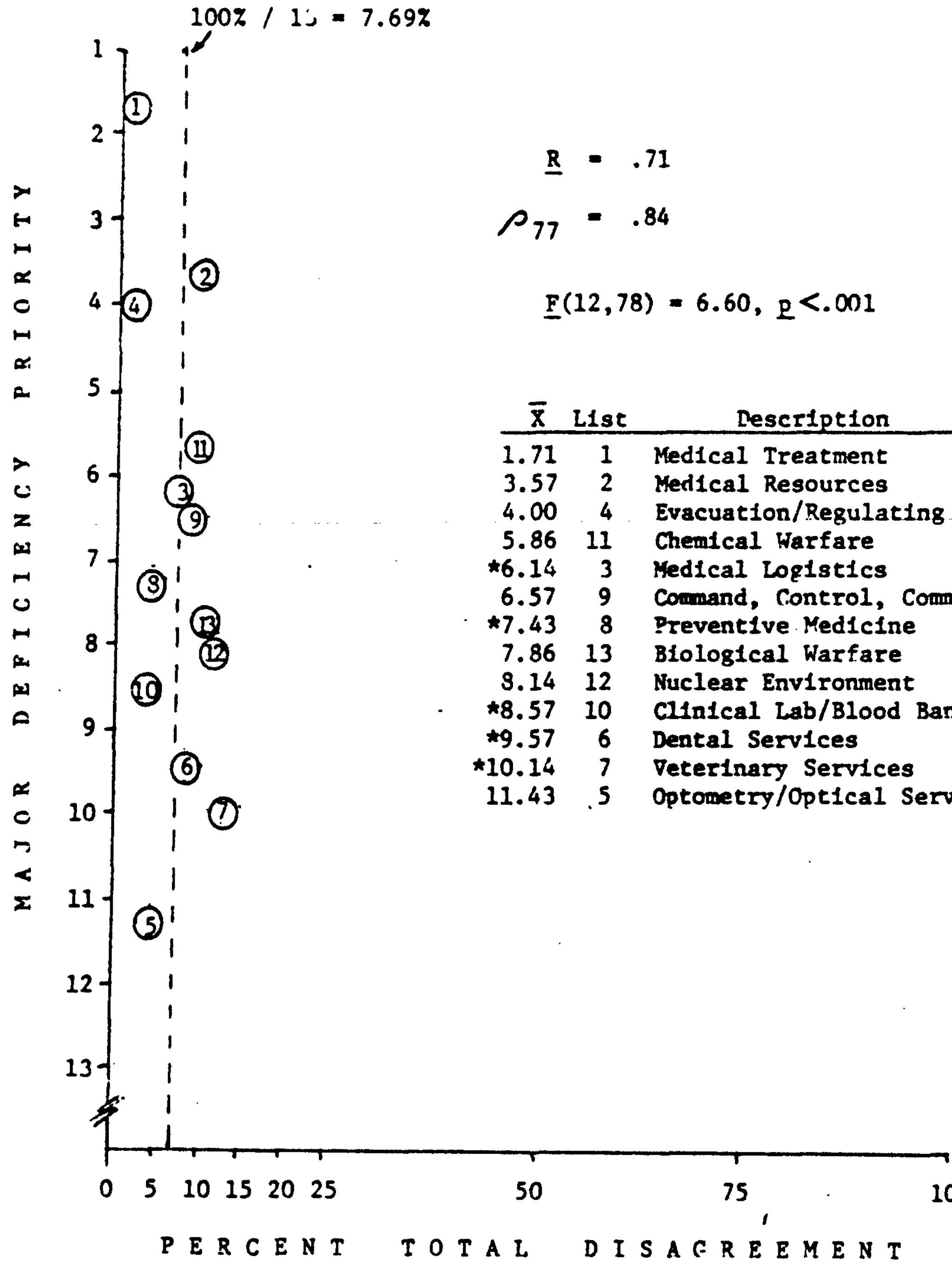
Table 7 (continued)

Item	Rank Order FIC	Rank Order AMEDD	Spearman Rank Difference Correlation[a]
11. Chemical Warfare Deficiencies			
Chemical prophylaxis	1	1	
Detection	2	2	
Decontamination patients	4	3	
MOPP medical treatment	5	4	
Contamination equip/supply	6	5	*rho* (5 d.f.)=.79*
Protective shelter patients	3	6	
Medical materiel package	7	7	
12. Nuclear Environment Deficiencies			
Prophylaxis	2	1	
Detection	1	2	*rho* (1 d.f.) =.50, n/s
Medical materiel package	3	3	
13. Biological Warfare Environment Deficiencies			
Detection	1	1	
Prophylaxis	2	2	*rho* (1 d.f.) = 1.00
Medical materiel package	3	3	

[a] $*p<.05$, n/s = nonsignificant

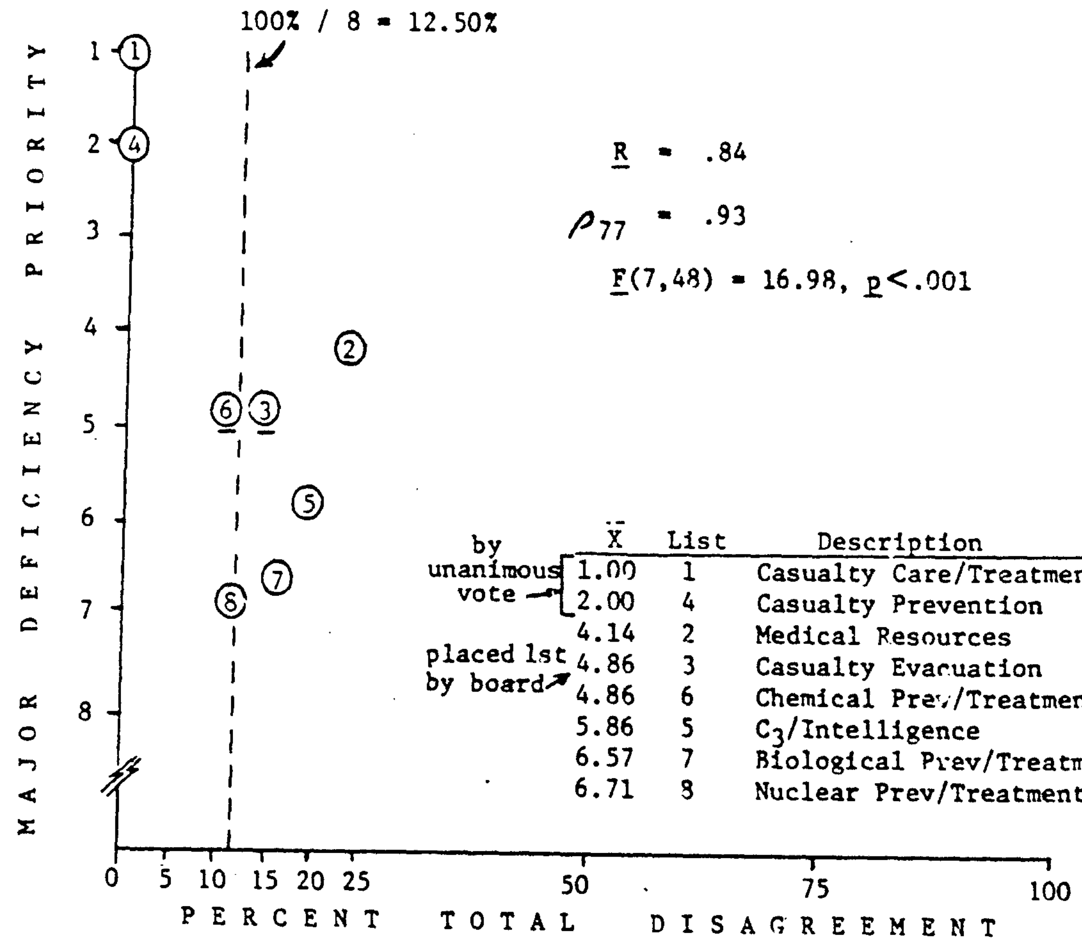
Summary statistics for the revised group judgments were computed by going back to the original J1 card decks and rearranging the cards to conform to the group's revised order (J2). A new decision matrix was constructed and multiple linear regression analyses were computed on the rearranged data set. As shown, the goodness-of-fit for the revised group equation increased from $R = .71$ to $R = .84$ (within the good to excellent range). A corresponding increase in inter-rater reliability also emerged for the J2 judgments (.93 versus the original J1 value of .84). Significant differences were again observed among the new list averages. While lists 6 (Chemical Treatment and Prevention) and 3 (Casualty Evacuation) were tied -- mean = 4.86 -- the board unanimously placed Casualty Evacuation ahead of Chemical Treatment and Prevention. Again it must be emphasized that such extensive revisions would be very unlikely if the analyses relied upon only nominal group input.

Final list of major deficiencies and rescaled values. Table 8 presents a summary of the prioritization actions for the major medical combat mission areas. Column 1 of the table contains a facsimile of the MAA list that was prepared and distributed to members of the AMEDD General Officer Board prior to adjournment. Columns 2 and 3 were appended to provide an exact audit trail of the J1-J2 decision-making sequence. A summary of the statistical indicators is shown at the bottom of the table.



$\bar{X}$	List	Description
1.71	1	Medical Treatment
3.57	2	Medical Resources
4.00	4	Evacuation/Regulating
5.86	11	Chemical Warfare
*6.14	3	Medical Logistics
6.57	9	Command, Control, Comm
*7.43	8	Preventive Medicine
7.86	13	Biological Warfare
8.14	12	Nuclear Environment
*8.57	10	Clinical Lab/Blood Bank
*9.57	6	Dental Services
*10.14	7	Veterinary Services
11.43	5	Optometry/Optical Services

Figure 7. AMEDD General Officer Board independent judgment (J1) results for major medical combat deficiency priorities.



$\bar{X}$	List	Description
1.00	1	Casualty Care/Treatment
2.00	4	Casualty Prevention
4.14	2	Medical Resources
4.86	3	Casualty Evacuation
4.86	6	Chemical Prev/Treatment
5.86	5	C_3/Intelligence
6.57	7	Biological Prev/Treatment
6.71	8	Nuclear Prev/Treatment

Summary of Revisions

J1 Independent Judgment Lists	J2 Revised Group Judgment Lists
Medical Treatment(9) → Optometry(1) Clinical/blood(2) Dental (2) Veterinary(1)	Casualty Care/Treatment(15)
Preventive Medicine(1) → Logistics(2)	Casualty Prevention(3+2 new* =5)
Medical Resources(10) → Logistics(11) Clinical/blood(3) Optometry(1) Preventive med(1) Dental(1) Veterinary(1)	Medical Resources(28)
Evacuation and Regulating(3) →	Casualty Evacuation(3)
Chemical Warfare(7) →	Chemical Prev/Treatment(7)
Command,Control, Communication(4) →	C_3/Intelligence(4)
Biological Warfare(3) →	Biological Prev/Treatment(3)
Nuclear Environment(3) →	Nuclear Prev/Treatment(3)

Note: ( ) indicates nr. items moved. *Two items added by MAA staff

Figure 8. AMEDD General Officer Board revised group judgment (J2) results for major medical combat deficiency priorities.

Table 8

Final List of Major Medical Combat Deficiencies and Rescaled Values

MAA Priorities List	J1 Average List Rank	J2 Average List Rank	0 to 1.0 Rescaled Value
1. CASUALTY CARE/TREATMENT	1.71	1.00	1.000
Optometry	(11.43)		
Dental	(9.57)		
Clinical Lab/Blood	(8.57)		
2. CASUALTY PREVENTION	7.43	2.00	.857
3. MEDICAL RESOURCES	3.57	4.14	.551
Logistics	(6.14)		
Force Structure	---		
Vet	(10.14)		
4. CASUALTY EVACUATION	4.00	4.86	.449
5. CHEMICAL PREVENTION AND TREATMENT	5.86	4.86	.449
6. C_3/INTELLIGENCE	6.57	5.86	.306
7. BIOLOGICAL PREVENTION AND TREATMENT	7.86	6.57	.204
8. NUCLEAR PREVENTION AND TREATMENT	8.14	6.71	.184

Summary Statistics:

Goodness-of-fit R =	.71	.84
Inter-rater reliability ρ_{77} =	.84	.93
Item rank mean differences		
(df_1, df_2) =	(12,78)	(7,48)
F =	6.60,	16.98,
$p <$	.001	.001

After the final prioritized rank averages for the medical mission areas had been established, the major area "list of lists" and the subarea lists were prepared for submission to the Logistics Center at Ft Lee, Virginia, to be incorporated with other combat service support MAAs. To be compatible with other proponent school MAA results, rank averages were converted to scale values ranging from 0.0 (lowest possible rank) to 1.0 (highest possible rank) by the use of a linear transformation equation. The rescaled values produced by the IDM ranking process are equivalent to the "normalized measures of effectiveness" (0 to 1.0) produced by the pairwise comparison technique (TRADOC Mission Area Analysis, Note 3). While both techniques are based upon ipsative measurement assumptions, the major difference between the two methods is that the IDM process employs both nominal and interactive decision-making groups of experts but the pair-wise comparison technique models decisions based only upon nominal groups.

The linear transformation equation for converting the J2 average ranks to 0 - 1.0 values employed the following rescaling equation:

$$Y = 1.143 - .143\,\overline{X}\ , \qquad [3]$$

where Y is the rescaled 0 - 1.0 value, 1.143 is the Y intercept, -.143 is the slope of the rescaling function, and $\overline{X}$ takes on the values of the original J2 rank averages. Equivalent rescaled values for the MAA priorities are shown in column four of Table 8. The nature of the equivalent values is such that an average rank of 1.0 resulted in a rescaled value of 1.0. Correspondingly, an average rank of 8 would result in a rescaled value of zero (0.0). Because the lowest average rank was 6.71 (Nuclear), the full range of possible rescaled values is not reflected by the AMEDD MAA submission.

Rescaling and Assembly of Revised Subarea Deficiency Lists

Once the revised major deficiency areas had been determined by the General Officer Board, the subarea items contained in each required reprioritization since several major areas were merged (i.e., Medical Resources and Medical Logistics), and some were deleted as major areas (i.e., Veterinary and Optometry/Optical Services). Reprioritization could have been accomplished by another day of card-sorting and IDM analysis. Instead, rank order means from the initial J1 item results were rescaled and merged into the newly revised major areas by forming summation scores which credited rescale items with values for the list they appeared on and their placement within the particular major list.

First, the J1 subarea item rank means were rescaled to a common unit of measurement using simple linear transformation equations. The transformed rank scale ranged from zero (lowest item priority rank) to 1.0 (highest priority rank = 1). Table 9 presents the rescaling equations and rescaled values for the deficiency subareas. Items which were to be merged with or moved to other lists are identified also.

Next, each of the J1 major deficiency area rank means were transformed to zero-one scores with the following rescaling equation: $Y = 1.083 - .083\overline{X}$. Zero-one list scores range from .94 for Medical Treatment ($\overline{X}$ = 1.71) to .13

Table 9

0-1.0 Rescaled Values for Subarea Deficiencies

AMEDD General Officer Board

Deficiency Item List	0-1.0 Value	Rescaling Equation/J2 Revision
1. Medical Treatment		$Y = 1.125-.125\overline{X}$
Resuscitation	.82	
Med/surg in battle	.75	
Self/buddy aid	.70	All items incorporated into casualty care/treatment
Laser/microwave injury	.52	
Combat stress	.52	
Med pro equip ops	.46	
Maxillofacial	.34	
Dental/vet emergency	.29	
Monitor vital sign/MOPP	.11	
2. Medical Resources		$Y = 1.11-.11\overline{X}$
COMMZ hospital assets	.98	
COMMZ hospital augmentation	.81	
Clinical lab requirements	.52	
MOS/SSI identifiers	.51	All items remained in medical resources
Civ structure conversion	.44	
Field kitchen	.43	
Optometry teams support	.40	
Vet svcs & DOD structure	.33	
Med food support	.32	
Dental at general hospitals	.25	
3. Medical Logistics		$Y = 1.083-.083\overline{X}$
Med resupply	.77	
Eye protection (frag radn)	.75	--------Moved to casualty prevention
Decontaminants (med sup)	.73	
Med unit mobility wt/cube	.67	
Power & illumination	.56	
Dental field equip	.49	
Test, meas, equip	.44	
Mat hdlg med sup	.44	
Env protection (pat in evac)	.43	--------Moved to casualty prevention
Refrigeration	.36	
Lens fabrication	.36	
Covered stor (med sup)	.29	
Field optometry equip	.21	
(With the exception of the two items indicated, all items moved to medical resources)		

Table 9 (continued)

Deficiency Item List	0-1.0 Value	Rescaling Equation/J2 Revision
4. Patient Evacuation & Regulation		$Y = 1.50-.50\overline{X}$
Air ground evac vehicles	.86	
Ground ambulance	.65	All items incorporated into
Field medical records	.0	casualty evacuation
5. Optometry/Optical Service		$Y = 2.0-1.0\overline{X}$
Visual corr/protection	.86	--------Moved to medical resources
Optometry pers op of equip	.14	--------Moved to casualty care/treat
6. Dental Service		$Y = 1.50-.50\overline{X}$
Dental health indiv soldier	.79	--------Moved to casualty care/treat
Maxillofacial materiel	.50	--------Moved to medical resources
Dental pers in battle	.22	--------Moved to casualty care/treat
7. Veterinary Service		$Y = 2.0-1.0\overline{X}$
Vet Corp off in battle	.57	--------Moved to casualty care/treat
Working dog	.43	--------Moved to medical resources
8. Preventive Medicine		$Y = 2.0-1.0\overline{X}$
Early warning	.57	Incorporated into casualty prevention
Medical unit organization	.43	--------Moved to medical resources
9. Medical Command, Control, & Communication		$Y = 1.33-.33\overline{X}$
PLRS/JTID & Systems	.76	
Med reg in battle	.71	All items incorporated into
Intelligence assets	.38	C3/Intelligence
Linguistics resources	.14	
10. Clinical Lab/Blood Bank Services		$Y = 1.25-.25\overline{X}$
Whole blood substitutes	.72	--------Moved to casualty care/treat
Blood distr in theater	.57	--------Moved to casualty care/treat
Lab volume capability	.43	--------Moved to medical resources
Blood bank team org	.43	--------Moved to medical resources
Blood shipping containers	.36	--------Moved to medical resources

Table 9 (continued)

Deficiency Item List	0-1.0 Value	Rescaling Equation/J2 Revision
11. Chemical Warfare		$Y = 1.167-.167\overline{X}$
Chemical prophylaxis	.88	
Detection	.72	
Decontamination patients	.60	All items incorporated into chemical prevention/threat
MOPP medical treatment	.45	
Decontamination equip/sup	.33	
Protective shelter pat	.29	
Medical mat package	.24	
12. Nuclear Environment		$Y = 1.50-.50\overline{X}$
Prophylaxis	.86	All items incorporated into nuclear prevention/threat
Detection	.57	
Med materiel package	.07	
13. Biological Warfare Environment		$Y = 1.50-.50\overline{X}$
Detection	.72	All items incorporated into biological prevention/threat
Prophylaxis	.72	
Med materiel package	.07	
Two new items appended to casualty prevention		
Monitor/correct health hazards	-	
Doctrine, tng for combat stress	-	

NOTE: Rescaling equations were applied to item rank averages, $\overline{X}$, to produce the linearly transformed 0 to 1.0 value Y. Rescaling equations are of the general form: $Y = a + b\overline{X}$ where Y is a predicted score, a is the Y intercept, b is the slope, and $\overline{X}$ is the raw rank average score. Rescaling equations vary depending on the number of items per list.

for optometry/optical services ($\overline{X}$ = 11.43). Final item scores were then calculated for subareas by the sum of the transformed item value (placement within a list) and the corresponding major list score.

Items for merged lists were resequenced according to the magnitude of their final item scores. The final prioritized lists of subarea deficiencies from the AMEDD General Officer Board are at Appendix III.

The final prioritization results of the AMEDD General Officer Board were included as Chapter 13 in the detailed 200-page Medical Substudy report for Combat Service Support Mission Area Analysis (Level II) by the Directorate of Combat Developments, AHS, Ft. Sam Houston, TX (Note 4). Examples of the proposed corrective actions for the top two mission areas (Casualty Care and Treatment and Casualty Prevention) are contained in Appendix IV.

DISCUSSION AND CONCLUSIONS

The results of this reseach provide evidence that the application of the Iterative Decision Method (IDM) increases the productivity of expert group decision making. This finding supports the hypothesis that a systematic sequence of independent and revised group judgments produces more effective and efficient judgment results than the exclusive use of either nominal group surveys or typical interactive group meetings. Results from both the AHS Force Integration Committee and the AMEDD General Officer Board experts indicated that discussion of independent judgments (J1 feedback) led to more accurate revised group judgments (J2). Further, the members felt that group revisions of item priorities utilized their expertise to a greater degree. Experts also reported they were more confident about, and more satisfied with, the J2 decision results. Opportunities for interactive revision of judgments would not have existed if nominal group surveys, regardless of magnitude, had been employed in this study. Conversely, a board convened without the resources of J1 feedback results would have lacked full information about independent judgments in regard to mission areas of prior agreement and disagreement. The number and nature of revisions made by both expert panels, and in particular the latter group, clearly demonstrated the viability of iterative decision making.

While similar conclusions have been reached by Nominal Group Technique and Delphi process investigations (Delbecq et al., 1975), the primary advantage of the IDM is that item decisions and disagreements are quantified, displayed, and explicitly identified. The validity of the IDM process was also demonstrated by the highly similar findings obtained across expert panels for levels of prediction, inter-rater reliability, item dispersion, and patterns of deficiency item prioritization.

Medical Input to the U.S. Army Mission Area Analysis Program and Recommended Corrective Actions

The independent and revised group judgment (J1-J2) results of this study provide a defensible and comprehensive record of the prioritization of 68 specific medical combat support deficiencies and the proposed corrective actions for each. Subareas were grouped and prioritized within eight major medical mission areas. These decision-making products represent the intensive effort on the part of the Army Medical Department to assure that proposed solutions for priority medical mission deficiencies will be targeted for development and implementation. The eight prioritized mission areas included: 1) Casualty Care and Treatment, 2) Casualty Prevention, 3) Medical Resources, 4) Casualty Evacuation, 5) Prevention and Medical Treatment in Chemical Warfare, 6) Medical Command, Control, and Communications/Intelligence, 7) Prevention and Medical Treatment in Biological Warfare, and 8) Prevention and Medical Treatment in Nuclear Warfare.

The dual emphasis on prevention and treatment generally associated with the prioritized mission areas, and in particular with the top four areas, reflects historical combat casualty trends described by several medical observers (Neel, 1973; Reister, 1973). Casualty records from three conventional wars over the past 40 years consistently have indicated that the largest proportion of hospital admissions in the theater of operations

were due to the cumulative effects of disease. This was especially true in Korea and Vietnam where malaria and viral hepatitis reduced the number of soldiers available for duty and subsequently impacted troop strength and unit capabilities. The fact that medical personnel were equally susceptible to disease compounded the problem. Indicative of priorities 1 through 3, both medical care and prevention programs and the resources required to support them were necessary to control and lower the incidence of disease. Although admissions due to disease occurred at a higher rate, the length of time away from duty was shorter for disease casualties than for casualties that sustained battle wounds and injuries. Wounds and injuries usually required immediate surgical treatment (priorities 1 and 3) and carried a higher probability of evacuation (priority 4). Finally, it appears that the prevention and treatment concerns from the conventional theater of operations have been projected to the chemical, biological, and nuclear arenas as well.

The implications of the present findings impact upon management activities at many levels. The corrective actions associated with the priorities translate into medical mission requirements that will be aggregated with requirements at the combat service support level which will be input to both Army and DOD level missions. Due to limited funds, personnel, and state-of-the-art technology, not all corrective actions can be fully implemented. However, the top mission requirements will directly influence the direction of research efforts, systems development, and the allocation of military funds. In turn, new medical technologies, equipment, and procedures will result in new medical job requirements.

Having observed the broader implications of these results, it is necessary to consider the challenging impact that the corrective actions will have upon the management of AMEDD training and training development programs. Because many tasks performed by Army medical officers and enlisted personnel are technical in nature, individual soldiers assigned to TOE field units (versus TDA fixed facilities) for extended periods of time are faced with having to relearn some performance skills they have lost since formal schooling and Phase I and/or II training. Further, due to the rapid development of medical services and procedures, emergent job requirements cause some previously learned skills to become obsolete while simultaneously creating completely new performance skills and procedures that must be acquired. A cursory examination of the corrective actions required for the top two priorities of Casualty Care/Treatment and Casualty Prevention (see Appendix IV) renders a profusion of required training concerns which impact nearly every subarea deficiency. The potential utility of these prioritized combat service deficiencies for the identification of individual and collective medical training requirements is great, and will likely prove to be invaluable for furture planning, analysis, design, and development of training materials and services.

Implications of IDM Application of AMEDD Decision Making

The Iterative Decision Method (IDM) process consists of 1) a systematic sequence for obtaining independent and revised group judgments (J1-J2) from a panel of 5 or 7 experts, 2) a set of special application computer programs for the generation and analysis of multiple linear regression decision

equations, and 3) a standardized format for the graphic display of decision results. The technique can be used for making selection decisions (dichotomous variables, e.g., 1 = select, 0 = nonselect) or prioritization decisions (scaled ratings or rank order judgments) about a well defined collection of persons, objects, or events identified by some form of front-end-analysis. Since the IDM is modular, it can be used alone or in continuing iterations of selection and/or prioritization sequences. In addition to its present use in the prioritization of major and subarea medical combat deficiencies which linked the decision making of two expert panels, the technique has been successfully employed for the selection of medical tasks for training and for the prioritization of tasks into combat critical, mission essential, and other essential categories (Finstuen, Note 1; Carroll & Finstuen, Note 2). Because of the modular flexibility of the IDM, the process could easily be adapted for expert panels concerned with the selection and/or prioritization of project workloads, for budget and funding allocations and requests, personnel promotions, assignments for critical or sensitive jobs, equipment and project evaluations, construction and zoning problems, patient classification, and numerous other management planning and programming activities where an efficient and effective means for group decision making is required.

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Appendix I. Force Integration Committee Mission Area Analysis - J1 Deficiency Lists and Examples of Cards For Two Subarea Items

MEDICAL SUB-STUDY COMBAT SERVICE SUPPORT MISSION AREA ANALYSIS

DEFICIENCIES

1. MEDICAL TREATMENT ON THE BATTLEFIELD IS INADEQUATE:

a. Inadequate treatment regimes for laser/microwave injuries.

b. Inadequate resuscitation management system.

c. Inadequate medical/surgical treatment capability for battlefield injuries.

d. Inadequate capability for prevention, diagnosis, and treatment of combat stress reactions and neuropsychiatric disorders.

e. Individual soldier's capability to perform self/buddy aid is inadequate.

f. Medical professional and para-professional personnel are unable to adequately perform treatment tasks and operate field medical equipment.

g. Veterinary and dental corps officer's ability to perform emergency medical treatment is inadequate.

h. Inability to provide treatment and post-operative management of maxillofacial injuries and wounds.

SAMPLE CARDS FOR ITEMS a and b

MEDICAL TREATMENT DEFICIENCIES — ITEM 1

A. Inadequate tre
microwave inju

MEDICAL TREATMENT DEFICIENCIES — ITEM 2

b. Inadequate resuscitation management system.

2. MEDICAL FORCE STRUCTURE ON THE BATTLEFIELD IS INADEQUATE:

a. Combat zone and COMMZ hospital assets are insufficient to meet the requirements of the integrated battlefield.

b. Inadequate plans to provide for adaptation of existing civilian structures for field hospital use.

c. Power distribution and illumination systems in medical and dental units are inadequate.

d. COMMZ level hospitals are not capable of augmenting and/or reconstituting corps level treatment facilities.

e. Insufficient veterinary service units exist to support a total DOD mobilization force structure.

f. Optometry teams are inadequate to provide optometrical support under current basis of allocation rules.

g. Inability to identify professional and para-professional medical personnel with specialized skills using the current MOS identifiers.

h. Inadequate medical food service support at theater hospitals.

i. Inadequate dental hygiene support at the general hospitals and convalescent centers.

j. Clinical laboratory requirements exceed capability using current equipment and methodologies.

k. Inadequate field treatment and convalescent facilities present in the initial phase to restore projected case loads of minor wounds, DNBI, and combat stress casualties to duty.

3. MEDICAL LOGISTICS ON THE BATTLEFIELD ARE INADEQUATE:

a. Spectacle lens fabrication capability in the field is inadequate.

b. Current field optometry equipment is severely degraded by environmental conditions on the battlefield.

c. Inadequate eye protection from high velocity fragments and high intensity electromagnetic radiations results in preventable casualties.

d. The ability to monitor vital signs is inadequate during evacuation in MOPP or cold weather conditions.

e. Inadequate environmental protection for patients during evacuation.

f. Medical resupply support is inadequate.

g. Current decontaminants are inadequate for decontaminating medical materiel, supplies, and equipment.

h. Current refrigeration capability in medical treatment facilities is inadequate.

i. Materiel handling equipment for medical supplies is inadequate.

j. Test, measurement, and diagnostic equipment for medical items is inadequate.

k. Medical units lack the mobility necessary to keep up with supported units due to weight and cube of facilities, materiels, and supplies.

l. Dental field equipment items/sets are inadequate for dental operations.

m. Present assets to provide covered storage for medical supplies are inadequate.

4. PATIENT EVACUATION AND MEDICAL REGULATING ON THE BATTLEFIELD IS INADEQUATE:

a. Ground ambulances are inadequate to evacuate the large number of patients generated on the battlefield.

b. Current field medical records system on the integrated battlefield is antiquated.

c. Air and ground evacuation vehicles lack mobility and/or survivability in forward areas of the battlefield.

5. OPTOMETRY/OPTICAL SERVICES ON THE BATTLEFIELD ARE INADEQUATE:

a. Currently available visual correction/protection devices for the individual soldier (spectacles, contact lenses, sunglasses) are incompatible with battlefield requirements.

b. Optometry officers and enlisted personnel are unable to operate their TOE equipment in the battlefield environment.

6. DENTAL SERVICES ON THE BATTLEFIELD ARE INADEQUATE:

a. Dental personnel's ability to function in a battlefield environment and operate dental field equipment is inadequate.

b. Poor dental health of the individual soldier results in preventable dental casualties.

c. Current materiels and treatment methodologies for maxillofacial injuries are inadequate to provide responsive resuscitative care.

7. VETERINARY SERVICES ON THE BATTLEFIELD ARE INADEQUATE:

a. Veterinary services for the military working dog on the battlefield are inadequate.

b. Veterinary corps officers and enlisted personnel are not fully capable of performing required veterinary services on the battlefield.

8. PREVENTIVE MEDICINE SERVICES ON THE BATTLEFIELD ARE INADEQUATE:

a. Preventive medicine units are inadequately organized for deployment and function on the integrated battlefield.

b. Preventive medicine services lack the capability to detect, identify, and provide early warning of disease and biological warfare agents on the battlefield and in the individual soldier.

9. MEDICAL COMMAND, CONTROL, AND COMMUNICATION ON THE BATTLEFIELD ARE INADEQUATE:

a. Insufficient communication capability available to veterinary and dental detachments on the battlefield precludes responsive mission accomplishment.

b. Major deficiencies in C^3 will exist if the following systems are not fielded by projected initial operational capability:

PLRS/JTIDS Hybrid

SINCGARS

IHFR

TACCS

DAS-3

TAMMIS

CSS/CCS

c. Insufficient linguistic resources currently exist within the AMEDD in Russian, Russian satellite (Eastern European), and mid-eastern foreign languages to provide medical intelligence essential to friendly forces on the battlefield.

d. The command, control, and communication of medical regulating on the battlefield are inadequate.

e. Dedicated medical intelligence assets are unavailable to acquire and process critical data on disease/CBR threats at division and corps levels.

10. CLINCAL LABORATORY AND BLOOD BANK SERVICES ARE INADEQUATE:

a. Clinical laboratory capability to provide the required high volume of procedures is inadequate.

b. Blood shipping containers are inadequate.

c. Blood bank team organizations do not allow for completion of the mission on the battlefield.

d. Whole blood substitutes are inadequate.

e. Blood distribution in the theater of operations is inadequate.

11. MEDICAL HEALTH SERVICE SUPPORT IN A CHEMICAL ENVIRONMENT IS INADEQUATE:

a. Medical units lack detection equipment to identify and quantify the type of chemical contamination.

b. Medical equipment and supplies are rendered non-useable by chemical contamination.

c. Inadequate collective protection shelters for medical units.

d. MOPP decrements medical personnels' ability to treat.

e. Inability to decontaminate patients and medical supplies and equipment.

f. Lack of adequate chemical prophylaxis, antidotes, and therapeutic compounds.

g. Medical materiel packaging is inadequate to protect against chemical contamination.

12. MEDICAL HEALTH SERVICE SUPPORT IN A NUCLEAR ENVIRONMENT IS INADEQUATE:

a. Medical units lack detection equipment to identify and quantify the type of radiological contamination.

b. Lack of adequate radiological prophylaxis, antidotes, and therapeutic compounds.

c. Medical materiel packaging is inadequate to protect against radiological contamination.

13. MEDICAL HEALTH SERVICE SUPPORT IN A BIOLOGICAL ENVIRONMENT IS INADEQUATE:

a. Medical units lack detection equipment to identify and quantify the type of biological contamination.

b. Lack of adequate biological prophylaxis, antidotes, and therapeutic compounds.

c. Medical materiel packaging is inadequate to protect against biological contamination.

Appendix II. AMEDD General Officer Board

J1 Deficiency Lists and Sample Fact Sheets
for Subarea Deficiencies

Medical Treatment Deficiencies

1. Medical treatment capability is inadequate to treat and return large numbers of slightly disabled soldiers to battle and to preserve life and function among the seriously injured.

a. Inadequate treatment regimens for laser/microwave injuries.

b. Inadequate resuscitation capability for mass casualties.

c. Inadequate medical/surgical treatment capability for battlefield injuries.

d. Inadequate capability for prevention, diagnosis, and treatment of combat stress reactions and neuropsychiatric disorders.

e. Individual soldiers' capability to perform self/buddy aid is inadequate.

f. Medical professional and para-professional personnel are unable to adequately perform treatment tasks and operate field medical equipment.

g. Dental corps officers' ability to perform emergency medical treatment is inadequate.

h. Inability to provide treatment and post-operative management of maxillofacial injuries and wounds.

i. The ability to monitor vital signs is inadequate during evacuation in MOPP or cold weather conditions.

DEFICIENCY: Inadequate treatment regimes for laser/microwave injuries.

MISSION AREA REF: Medical Treatment #6, CSSMAA.

DESCRIPTION: There is inadequate knowledge of basic biophysical cellular and organ effect of laser, microwave, and millimeter wave energy. Doctrine is as yet unsettled on management of casualties from these energy sources as there are still unanswered questions as to extent and types of injuries from them. Although eye injuries are more likely from these sources, the potential of other organ injury is as yet undefined. Eye protection from multiband laser effects is also not yet provided. Psychological effects of employment of these energy sources as weapon systems has not been addressed.

DRIVING FACTOR: Inadequate knowledge of effects of those nonionizing radiation energy sources on the body seriously limits doctrinal decisions which in turn precludes training for either protection or management of injury.

CORRECTIVE ACTION:

	Mid (87-92)	Far (93-98)
1. Develop biophysical data base of nonionizing radiation injury.	X	
2. Develop doctrine for avoidance, protection, and treatment of inury.	X	
3. Develop training program based on doctrine for self aid/buddy aid to include psychological stresses.	X	
4. Develop training program based on doctrine for all levels of medical treatment personnel.	X	
5. Develop eye protection/body protection for nonionizing radiation injuries.	X	
6. Develop treatment materiel for such injuries.	X	
7. Develop medical management programs for such injuries.	X	

	OFFICE	NAME	AUTOVON
PROPONENT SCHOOL	AHS, HSHA_CDS	LTC Joe M. Burt	471-~~4300/6505~~
HQ TRADOC			

CLASSIFIED BY ____________

DEFICIENCY: Inadequate Resuscitation Mangement System.

MISSION AREA REF: Medical Treatment.

DESCRIPTION: The complex nature of resuscitative patient management, including such aspects as airway maintenance, hemostasis, fluid replacement, adjuvant drugs, and monitoring devices, requires further attention and development.

DRIVING FACTOR: Based on threat forces' capability to inflict high numbers of casualties, an improved management system for resuscitative patients is needed.

CORRECTIVE ACTION:	Mid (87-92)	Far (93-93)
1. Develop an integrated systems approach for resuscitation management including triage, treatment and proper resource utilization.	X	
2. Adopt appropriate state-of-the-art and near-term technological advances in devices, equipment and treatment compounds.	X	
3. Develop training packages incorporting 2. above.	X	

	OFFICE	NAME	AUTOVON
PROPONENT SCHOOL	AHS, HSHA-CDS	LTC Joe M. Burt	471-4300/6565
HQ TRADOC			

CLASSIFIED BY ______________

DEFICIENCY: Inadequate Medical and Surgical Treatment Capability for Battlefield Injurie

MISSION AREA REF: Medical Treatment

DESCRIPTION: Lack of knowledge on biophysiological processes involved in battlefield injuries hinders treatment and optimal medical management of injured soldiers. Appropriate treatments/compounds are sometimes not available.

DRIVING FACTOR: The threat force capability to inflict large numbers of casualties on the high intensity battlefield requires optimum useage of all medical resources.

CORRECTIVE ACTION:	Mid (87-92)	Far (93-98)
1. Develop an expanded biophysiological data base for all injury categories to enable appropriate doctrinal changes.	X	
2. Adjust all training programs as new knowledge is incorporated, i.e., individual and collective programs.	X	
3. Materiel changes will follow developments from basic research as new drugs and other treatment compounds emerge.	X	

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Medical Resource Deficiencies

2. Medical resources on the projected battlefield are inadequate to treat, process, and evacuate the wounded, injured and ill and to reconstitute medical unit losses.

a. Combat zone and COMMZ hospital assets are insufficient to meet the requirements of the integrated battlefield.

b. Inadequate plans exist to convert civilian structures for hospital use.

c. COMMZ level hospitals are incapable of augmenting and/or reconstituting corps level treatment facilities.

d. Insufficient veterinary service units exist to support a total DOD mobilization force structure.

e. Optometry teams are inadequate to provide optometrical support under current basis of allocation rules.

f. Medical food service support at theater hospitals is inadequate.

g. Dental hygiene support at the general hospitals and convalescent centers is inadequate.

h. Clinical laboratory requirements exceed capability, using current equipment and methodologies.

i. The field kitchen system to provide medical food service in the theater is inadequate.

j. Current MOS and SSI identifiers are insufficient to adequately identify professional and para-professional medical personnel with specialized skills.

Medical Logistics Deficiencies

3. Current medical logistics capability is inadequate to provide the types, levels and components of supplies and equipment necessary to efficiently support the battlefield force; further, medical mobility is incompatible with fighting force units' mobility capacity.

a. Spectacle lens fabrication capability in the field is inadequate.

b. Current field optometry equipment is severely degraded by environmental conditions on the battlefield.

c. Inadequate eye protection from high velocity fragments and high intensity electromagnetic radiations results in otherwise preventable casualties.

d. Inadequate environmental protection exists for patients during evacuation.

e. Medical resupply support is inadequate.

f. Current decontaminants are inadequate for medical materiel, supplies, and equipment.

g. Current refrigeration capability in medical treatment facilities is inadequate.

h. Materiel handling equipment for medical supplies is inadequate.

i. Test, measurement, and diagnostic equipment for medical equipment is inadequate.

j. Medical units lack the mobility necessary to keep up with supported units due to weight and cube of facilities, materiels, and supplies.

k. Dental field equipment items/sets are inadequate for dental operations.

l. Present assets to provide covered storage for medical supplies are inadequate.

m. Power distribution and illumination systems in medical and dental units are inadequate.

Patient Evacuation and Regulating Deficiencies

4. Patient evacuation capacity and medical patient regulating are inadequate to transport and regulate the projected types and numbers of battlefield casualties, resulting in increased morbidity rates as well as burdening forward units' transportation resources.

a. Ground ambulances are too few and inadequate to evacuate the large number of patients generated on the battlefield.

b. Current field medical records system on the integrated battlefield is inadequate.

c. Air and ground evacuation vehicles lack mobility capacity and/or survivability in forward areas of the battlefield.

Optometry/Optical Service Deficiencies

5. Optometry/optical services and resources are inadequate to preserve critical visual function of the engaged battlefield force.

a. Currently available visual correction/protection devices for the individual soldier (spectacles, contact lenses, sunglasses) are incompatible with battlefield requirements.

b. Optometry officers and enlisted personnel are unable to operate their TOE equipment in the battlefield environment.

Dental Service Deficiencies

6. Dental services on the battlefield are inadequate to provide quick medical/surgical care to soldiers on the battlefield and to prevent, treat, and promptly return dental casualties to battle.

a. Ability of dental personnel to function in a battlefield environment and operate dental field equipment is inadequate.

b. Poor dental health of individual soldiers results in preventable dental casualties and their loss from battlefield engagement.

c. Current materiels and treatment methodologies for maxillofacial injuries are inadequate to provide responsive resuscitative care.

Veterinary Service Deficiencies

7. Veterinary resources and services on the battlefield are inadequate to insure safety of subsistence items to the combatant force, to provide emergency medical/surgical support, and to assure the continued functioning of military working dogs.

a. Veterinary services for the military working dog on the battlefield are insufficient.

b. Veterinary corps officers and enlisted personnel are not fully capable of performing required veterinary services on the battlefield.

Preventive Medicine Deficiencies

8. Preventive medicine services and resources are inadequate to prevent disease debilitating to the fighting force on the integrated battlefield.

a. Preventive medicine units are inadequately organized for deployment and function on the integrated battlefield.

b. Preventive medicine services lack the capability to detect, identify, and provide early warning of disease and biological warfare agents on the battlefield and in the individual soldier.

Medical Command, Control, and Communications Deficiencies

9. Medical command, control and communication are inadequate to coordinate essential medical units' activities at all levels on the integrated and electronic warfare battlefields.

a. Major deficiencies in C^3 exist in the absence of the following systems:

PLRS/JTIDS Hybrid

SINCGARS

IHFR

TACCS

DAS-3

TAMMIS

CSS/CCS

b. Insufficient linguistic resources currently exist within the AMEDD in Russian, Russian satellite (Eastern European), and mid-eastern foreign languages to provide medical intelligence essential to friendly forces on the battlefield.

c. The command, control, and communication of medical regulating on the battlefield are inadequate.

d. Dedicated medical intelligence assets are unavailable to acquire and process critical data on disease/CBR threats at division and corps levels.

Clinical Laboratory and Blood Bank Services Deficiencies

10. Clinical laboratory and blood bank services are inadequate to process the required high volume of laboratory procedures and to collect, process, and distribute blood requirements.

a. Clinical laboratory capability to provide the required high volume of procedures is inadequate.

b. Blood shipping containers are inadequate.

c. Blood bank team organizations do not allow for completion of the mission on the battlefield.

d. Whole blood substitutes are inadequate.

e. Blood distribution in the theater of operations is inadequate.

Medical Support Deficiencies in CW

11. Medical support in a chemical environment is inadequate to return casualties to the battlefield or to preserve the lives of projected numbers of chemical casualties.

a. Medical units lack detection equipment to identify and quantify the type of chemical contamination.

b. Medical equipment and supplies are rendered non-useable by chemical contamination.

c. Inadequate collective protection shelters exist for medical units' treatment of chemical casualties.

d. MOPP decrements medical personnels' ability to treat.

e. Capacity to decontaminate patients and medical supplies and equipment is inadequate.

f. Chemical prophylaxis, antidotes, and therapeutics are inadequate.

g. Medical materiel packaging is inadequate to protect against chemical contamination.

Medical Deficiencies in a Nuclear Environment

12. Medical support in a nuclear environment is inadequate to function effectively in radioactive areas and/or to return to duty or preserve life of projected nuclear blast/burn/radiation casualties.

a. Medical units lack detection equipment to identify and quantify the type of radiological contamination.

b. Radiological prophylaxis, antidotes, and therapeutic compounds are inadequate for projected needs.

c. Medical materiel packaging is inadequate to protect against radiological contamination, and EMP.

Medical Deficiencies in a BW Environment

13. Medical support in a biological environment is inadequate to protect the force against mass epidemics due to threat BW agents and to conserve its capacity to fight.

a. Medical units lack detection equipment to identify and quantify the type of biological contamination.

b. Biological prophylaxis, antidotes, and therapeutics compounds are inadequate.

c. Medical materiel packaging is inadequate to protect against biological contamination.

Appendix III. AMEDD General Officer Board Final Prioritized Major and Subarea Deficiency Lists Developed From Rescaled Values

Casualty Care/Treatment Deficiencies

1. Casualty treatment capability is inadequate to treat and return large numbers of slightly disabled soldiers to battle and to preserve life and function among the seriously injured.

   a. Inadequate resuscitation capability for mass casualties.

   b. Inadequate medical/surgical treatment capability for battlefield injuries.

   c. Individual soldiers' capability to perform self/buddy aid is inadequate.

   d. Inadequate treatment regimes for directed energy injuries.

   e. Inadequate capability for diagnosis and treatment of combat stress reactions and neuropsychiatric disorders.

   f. Medical professional and para-professional personnel are unable to adequately perform treatment tasks and operate field medical equipment.

   g. Inability to provide treatment and post-operative management of maxillofacial injuries and wounds.

   h. Dental corps officers' ability to perform emergency medical treatment is inadequate.

   i. Whole blood substitutes are inadequate.

   j. Poor dental health of individual soldiers results in preventable dental casualties and their loss from battlefield engagement.

   k. The ability to monitor vital signs is inadequate during evacuation in MOPP or cold weather conditions.

   l. Blood distribution in the theater of operations is inadequate.

   m. Veterinary corps officers and enlisted personnel are not fully capable of performing requir ed veterinary services on the battlefield.

   n. Ability of dental personnel to function in a battlefield environment and operate dental field equipment is inadequate.

   o. Optometry officers and enlisted personnel are unable to operate their TOE equipment in the battlefield environment.

Casualty Prevention Deficiencies

2. Casualty prevention services and resources are inadequate to prevent disease and health hazards debilitating to the fighting force on the integrated battlefield.

a. Inadequate eye protection from high velocity fragments and high intensity electromagnetic radiations results in otherwise preventable casualties.

b. Preventive medicine services lack the capability to detect, identify, and provide early warning of disease on the battlefield and in the individual soldier.

c. Inadequate recognition, monitoring, and correction of health hazards to crews and nearby friendly forces from military weapons and other systems.

d. Inadequate doctrine, training, and medical/mental health capability for the prevention of combat stress casualties.

e. Inadequate environmental protection exists for patients during evacuation.

Medical Resource Deficiencies

3. Medical resources on the projected battlefield are inadequate to treat, process, and evacuate the wounded, injured and ill and to reconstitute medical unit losses.

a. Combat zone and COMMZ medical treatment facilities are insufficient to meet the requirements of the integrated battlefield.

b. COMMZ level hospitals are incapable of augmenting and/or reconstituting corps level treatment facilities.

c. Medical resupply support is inadequate.

d. Clinical laboratory requirements exceed capability using current equipment and methodologies.

e. Current decontaminants are inadequate for medical materiel, supplies, and equipment.

f. Inability to identify professional and para-professional medical personnel with specialized skills using the current MOS identifiers.

g. Medical units lack the mobility necessary to keep up with supported units due to weight and cube of facilities, materiels, and supplies.

h. Inadequate plans exist to convert civilian structures for hospital use.

i. Preventive medicine units are inadequately organized for deployment and function on the integrated battlefield.

j. The field kitchen system to provide medical food service in the theater is inadequate.

k. Optometry teams are inadequate to provide optometrical support under current basis of allocation rules.

l. Power distribution and illumination systems in medical and dental units are inadequate.

m. Insufficient veterinary service units exist to support a total DOD mobilization force structure.

n. Medical food service support at theater hospitals is inadequate.

o. Dental field equipment items/sets are inadequate for dental operations.

p. Dental hygiene support at the general hospitals and convalescent centers is inadequate.

q. Test, measurement and diagnostic equipment for medical equipments is inadequate.

r. Materiel handling equipment for medical supplies is inadequate.

s. Currently available visual correction/protection devices for the individual soldier (spectacles, contact lenses, sunglasses) are incompatible with battlefield requirements.

t. Current refrigeration capability in medical treatment facilities is inadequate.

u. Spectacle lens fabrication capability in the field is inadequate.

v. Present assets to provide covered storage for medical supplies are inadequate.

w. Clinical laboratory capability to provide the required high volume of procedures is inadequate.

x. Blood bank team organization does not allow for completion of the mission on the battlefield.

y. Current materiels and treatment methodologies for maxillofacial injuries are inadequate to provide responsive resuscitative care.

z. Current field optometry equipment is severely degraded by environmental conditions on the battlefield.

aa. Blood shipping containers are inadequate.

bb. Veterinary services for the military working dog on the battlefield are insufficient.

Casualty Evacuation Deficiencies

4. Casualty evacuation capacity is inadequate to transport the projected types and numbers of battlefield casualties, resulting in increased morbidity rates as well as burdening forward units' transportation resources.

a. Air and ground evacuation vehicles lack mobility capacity and/or survivability in forward areas of the battlefield.

b. Ground ambulances are too few and inadequate to evacuate the large number of patients generated on the battlefield.

c. Current field medical records system on the integrated battlefield is inadequate.

Chemical Injury Treatment and Preventive Deficiencies

5. Medical treatment and prevention of injuries in a chemical environment are inadequate to return casualties to the battlefield or to preserve the lives of projected numbers of chemical casualties.

a. Chemical prophylaxis, antidotes, and therapeutics are inadequate.

b. Medical units lack detection equipment to identify and quantify the type of chemical contamination.

c. Capacity to decontaminate patients and medical supplies and equipment is inadequate.

d. MOPP decrements medical personnels' ability to treat.

e. Medical equipment and supplies are rendered non-usable by chemical contamination.

f. Inadequate collective protection shelters exist for medical units' treatment of chemical casualties.

g. Medical materiel packaging is inadequate to protect against chemical contamination.

Medical Command, Control, and Communications Deficiencies

G. Medical command, control, and communication are inadequate to coordinate essential medical units' activities at all levels on the integrated and electronic warfare battlefields.

a. Major deficiencies in C^3 exist in the absence of the following systems:

PLRS/JTIDS Hybrid

SINCGARS

IHFR

TACCS

DAS-3

TAMMIS

CSS/CCS

b. The command, control, and communication of medical regulations on the battlefield are inadequate.

c. Dedicated medical intelligence assets are unavailable to acquire and process critical data on disease/CBR threats at division and corps levels.

d. Insufficient linguistic resources currently exist within the AMEDD in Russian, Russian satellite (Eastern European), and mid-eastern foreign languages to provide medical intelligence essential to friendly forces on the battlefield.

Biological Injury Treatment and Prevention Deficiencies

7. Medical treatment and prevention of injuries in a biological environment are inadequate to protect the force against mass epidemics due to threat BW agents and to conserve its capacity to fight.

a. Medical units lack detection equipment to identify and quantify the type of biological contamination.

b. Biological prophylaxis, antidotes, and therapeutics compounds are inadequate.

c. Medical materiel packaging is inadequate to protect against biological contamination.

Nuclear Treatment and Prevention Deficiencies

8. Medical treatment and prevention of injuries in a nuclear environment are inadequate to function effectively in radioactive areas and/or to return to duty or preserve life of projected nuclear blast/burn/radiation casualties.

a. Radiological prophylaxis, antidotes, and therapeutic compounds are inadequate for projected needs.

b. Medical units lack detection equipment to identify and quantify the type of radiological contamination.

c. Medical materiel packaging is inadequate to protect against radiological contamination and EMP.

Appendix IV. Examples of Mission Area Analysis Corrective Actions for The Top Two Deficiency Areas

MISSION/TASK	DEFICIENCY
Provide timely and efficient patient treatment and hospitalization in the theater of operations.	1. Casualty treatment capacity is inadequate to treat and return large numbers of slightly disabled soldiers to battle, and to preserve life and function among the seriously wounded.

CORRECTIVE ACTIONS	ANALYSIS
Require an integrated systems approach for resuscitation (D-1) Augment training to enable effective utilization of state of art and near term technological advances (T-1) Incorporate present state of art materiel and other near term support and monitoring systems (M-1)	Chapter 2 Para 2-3
Develop a small, light, portable oxygen generation system, and compatible oxygen delivery system (M-2)	Chapter 3 Para 3-17
Develop expanded biophysiological data bases for all injury categories to enable doctrinal changes (M-3) Alter present training programs to incorporate new knowledge (T-2) Replace orthopedic surgeons at MASH units with general surgeons (O-1)	Chapter 2 Para 2-4
Require periodic training reinforcement as a command responsibility (D-2) Add psychological support training to first aid task list for the individual soldier (T-3) Develop exportable training packet to facilitate initial and periodic reinforcement of training for trainers (T-4) Identify or develop audiovisual scenarios to facilitate reinforcement of training (Step) for individual soldier (T-5) Provide adequate materiel for hands on training (M-4) Develop appropriate chemical/biological prophylaxis and antidote (M-5) Develop self/buddy aid equipment compatible with MOPP IV (M-6) Augmentation of first aid kit to include anitshock drugs and better hemostatic/anti-infection wound coverings (M-7) Make doctrinal decisions immediately to give direction for troop training (D-3)	Chapter 2 Para 2-6

CORRECTIVE ACTIONS	ANALYSIS
Decision at OTSG level to revise AOHMP to tie dental health status of combat and other units to readiness status (D-4) Train commanders on impact of dental casualties on unit performance (T-6) Provide definitive dental treatment either during BCT or AIT, between or after AIT (T-7 RDF units should be in combat ready dental status (T-8) Reinstitute a Dental Combat Effectiveness Program with emphasis on definitive dental care throughout the Army with priority to combat units (T-9) Develop and implement an Army standardized dental "At-Risk Profile" to meet mission essential needs (T-10)	Chapter 5 Para 5-28
Develop biophysical data base of nonionizing radiation injury (M-8) Develop doctrine for avoidance, protection, and treatment of injury (D-5) Develop training program based on doctrine for self aid/buddy aid to include psychological stresses (T-11) Develop training program based on doctrine for all levels of medical treatment personnel (T-12) Develop eye protection/body protection for nonionizing radiation injuries (M-9) Develop treatment materiel for such injuries (M-10) Develop medical management programs for such injuries (T-13)	Chapter 2 Para 2-2
Develop and publish operational doctrine for combat psychiatry and mental health services to provide better prevention and more timely diagnostic and treatment capabilities in forward areas (D-6) Increase training of officers and NCOs Army-wide for prevention, early recognition and basic management of combat stress (T-14) Increase training of all relevent paramedical and medical personnel (including mental health personnel) for specific skills in prevention, differential diagnosis, and treatment roles (T-15)	Chapter 2 Para 2-5

CORRECTIVE ACTIONS	ANALYSIS
Identify personnel with mental health SSIs for assignment to critical location (0-2)	con't Chapter 2 Para 2-5
Increase differential diagnostic skill and prevention/treatment capability at brigade medical company (forward) by mobilization assignment of a psychiatrist (60W) as one of the physicians; increase duties and rank of the senior full time behavioral science specialist (91G) (0-3)	
Increase capability in the division mental health section by addition of an E-8 NCOIC (91G), plus augmentation by skilled personnel in wartime (0-4)	
Improve capability throughout corps area by augmenting MTF's and by designating minimum one mobilization OM Team (psychiatric augmentation) per corps with clear peacetime and combat doctrine (0-5)	
Deploy CONUS OM Teams and convalescent centers early in the TPFD to CZ and COMMZ, augmented with additional resources such as occupational therapists (0-6)	
Develop improved diagnostic criteria through research, to include field-portable laboratory tests where practical, to differentiate organic brain syndromes, "hysterical" conversion reactions due to stress, and true CBR and laser injuries (M-11)	
Review and update drug treatment resources in forward units (0-7)	
Develop improved drugs to promote brief sleep, reduce anxiety, control agitation, and treat specific organ disorders (M-12)	
Increase field medical training for all AMEDD personnel (T-16)	Chapter 2 Para 2-7
Alter priorities of AHS to emphasize field medical education and training (0-8)	
Conduct cross training of paramedical personnel to secondary and tertiary MOS levels and identify this by additional skill identifier (T-17)	
Develop realistic training materiels for continued periodic individual and unit training (M-13)	
Increase the number of authorizations for training oral and maxillofacial surgeons (63N) (T-18)	Chapter 5 Para 5-22

CORRECTIVE ACTIONS	ANALYSIS
Change current TOE of CSH and EVAC hospitals to add one general dentist (63B) and one dental lab specialist (42D) as a minimum (O-7) Change TOE of CSH and EVAC to add a limited dental lab equipment set to support fabrication of surgical appliances (O-8)	con't Chapter 5 Para 5-22
Develop an acceptable oxygen carrying blood substitute (M-14)	Chapter 7 Para 7-6
Decision at OTSG level to fully implement adequate field medical training in conjunction with AMEDD personnel (T-19) Dental personnel participate in the Combat Casualty Care Course (T-20) Establish trauma training programs for dental officers at every dental unit in conjunction with MEDDAC/MEDCEN under a POI from AHS (T 21) Rotate dental officers through hospital facilities to receive training in those areas identified (T-22) Change SSI of 63A9D for personnel assigned to unit dental support (O-9) Advanced trauma life support training must be a continuing training program (T-23)	Chapter 5 Para 5-23
Establish doctrine for a blood distribution system (D-9)	Chapter 7 Para 7-7
Implement adequate field veterinary training for all veterinary service personnel (T-24) Develop field veterinary training programs in support of major regional FTXs (T-25)	Chapter 4 Para 4-39
Develop a non-invasive vital signs monitor (M-15) Train user personnel on above equipment (T-26)	Chapter 3 Para 3-9
Implement meaningful field training for all AMEDD dental personnel (T-27)	Chapter 5 Para 5-27

CORRECTIVE ACTIONS	ANALYSIS
Authorize and fund necessary field dental equipment for each dental organization (0-10) Eliminate unnecessary and non-mission essential annual training requirements (T-28)	con't Chapter 5 Para 5-27
Provide realistic combat field training for division optometry sections with only TOE equipment (T-29) Fully staff and equip teams OH (0-11)	Chapter 10 Para 10-11

MISSION/TASK	DEFICIENCY
Provide preventive medicine services on the battlefield by reducing the individual soldier's exposure to disease and other environmental hazards.	2. Casualty prevention services and resources are inadequate to prevent disease and health hazards debilitating to the fighting force on the integrated battlefield.

CORRECTIVE ACTIONS	ANALYSIS
Train soldier's to use protective eye armor (T 30) Acquire combat spectacles (M-16) Purchase spectacle lens edging equipment for optical labs and all optical fabrication units (M-17) Issue combat spectacles to every soldier (D-10)	Chapter 10 Para 10-6
Conduct training on laser radiation threat (T-31) Utilize monocular devices to minimize simultaneous loss of vision in both eyes (M-18) Develop protective eye armor for laser radiation (M-19)	Chapter 10 Para 10-7
Provide training on nuclear flash threat and protection (T-32) Develop protective eye armor for nuclear flash (M-20)	Chapter 10 Para 10-8
Increase training in the development and use of tactical medical intelligence to provide early warnings of disease outbreaks (T-33) Develop doctrine on collection dissemination and use of medical intelligence relating to endemic diseases, dysfunction injuries and biowarfare agents (D-11) Change doctrine on the tactical use of PVTMED teams to collect and disseminate medical intelligence data (D-12) Increase the number of epidemiologists in the tactical area (O-12) Develop a realtime tactical disease/dysfunction/injury data collection system that will be used (M-21)	Chapter 6 Para 6-3
Develop equipment to rapidly identify actual disease non battle injury agents (M-22) Develop a system for rapid diagnoses of infectious disease and bio warfare agents (M-23) Develop a system to rapidly identify potential bio-warfare agents and endemic diseases of military importance(M-24)	Chapter 6 Para 6-4

CORRECTIVE ACTIONS	ANALYSIS
Provide doctrine as to requirements for combined or separate natural/artifical environmental protection (D-13) Provide doctrine as to whether to use disposable or reusable protection during evacuation (D-14) Develop environmental protective devices for patient evacuation (M-25)	Chapter 2 Para 2-11
Determine levels at which blast overpressure causes auditory and nonauditory injury, evaluate the probability that certain current and proposed weapons systems will cause such injury, and determine optional procedures for preventing such injury (D-15) Determine the short- and long-term effects of exposure to combat vehicle noise and vibration upon crew health and performance and recommend appropriate means of ameliorating the impact of these effects (D-16) Determine the effects of heat, cold, high terrestrial altitude, diet and their interrelationships upon health and performance, both inside vehicles and outside, and develop and evaluate prophylactic measures to reduce the impact of adverse effects (M-26) Determine the requirements for life support biotechnology and impact protection in Army combat vehicles and recommend optimal methods for meeting the requirements (M-27) Determine the effect of human exposure to electromagnetic radiation (lasers microwaves and millimeter waves) and recommend safe exposure levels (D-17) Assess the long- and short-term health effects of toxic chemicals to which Army personnel and civilian employees are exposed and recommend safe exposure levels (D-18) Develop dietary measures which will extend the use of operational rations and maximize work, psychomotor and mental performance effectiveness during rapid deployment and sustained operations in all environmental extremes (M-28) Evaluate the effects of combat stress upon individual and unit mental health and cohesion and develop prophylactic measures to reduce the number of psychiatric casualties (M-29) Evaluate the physical requirements applicable to specific military tasks and determine the physical and psychological limitations which affect soldier performance during sustained operations in order to recommend physical standards and staffing ratios (D-19)	Chapter 6 Para 6-5

CORRECTIVE ACTIONS	ANALYSIS
Assess the levels of sensory enhancement (predominantly of the visual and auditory senses) required on the battlefield in order to provide maximum information to the soldier (night vision, communications information display, etc.) and recommend the most effective means of providing it (M-30)	con't Chapter 6 Para 6-5
Accomplish army-wide policies which increase unit cohesion, decrease turbulence, promote realistic conventional and NBC training, minimize drug and alcohol abuse, insure physical fitness, and provide stable family "home fronts" (D 20) Develop and publish operational doctrine for Combat Psychiatry and Mental Health Services to provide better prevention of factors which contribute to combat stress casualties (D-21) Increase training of officers and NCO's Army-wide for prevention, early recognition and basic management of combat stress (T-35) Increase training of all relevent paramedical and medical personnel (including mental health personnel) for specific skills in prevention of combat stress casualties (T-36) Increase combat stress casualty prevention capability at Bde by increasing duties and rank of the brigade senior Beh Sci Sp (91G) (D-22) Involve Div Mental Health Sections in unit field exercises, command consultation and teaching rather than be absorbed into MEDDACs (D-23) Increase preventive capability in the Div Mental Health Section by addition of an E 8 NCOIC (91G) (O-13) Improve preventive capability throughout corps area by designating one mobilization OM Team (Psychiatric Augmentation) per corps with clear peacetime and combat doctrine (O-14) Develop improved behavioral methods and drugs to promote brief sleep and control anxiety (M-31)	Chapter 2 Para 2-5

Appendix V. Background and Perception Assessment Questionnaire

INSTRUCTIONS: Please complete all of the questions below. Where appropriate indicate your response with an "X". Section I requests biographical information which will be used to construct a profile of expert board member characteristics. Section II requests your perceptions of the outcomes of board activities.

SECTION I. BIOGRAPHICAL/EXPERIENCE DATA

1. Name:		2. Age: [ ][ ] years
3. Gender: Male [ ] Female [ ]	4. Education: [ ][ ] years	Degree(s) (if any):
5. Organization:	6. Total active military experience: [ ][ ] years	7. Your experience in AMEDD units: [ ][ ] years
8. AMEDD Corps:		9. Military Grade:
10. Your experience in: TDA Units [ ][ ] years TOE Units [ ][ ] years	11. Combat experience: (if any) [ ][ ] years [ ][ ] months	Location:

SECTION II. EXPERTS' PERCEPTIONS OF ITEM ACTIONS AND OUTCOMES

For the following items please indicate your response by placing an "X" in the appropriate box. Please complete all items. DO NOT OMIT ANY.

Overall, how do you view <u>your</u> item ranking decisions?

[ ] 1. Extremely unsure
[ ] 2. Very unsure
[ ] 3. Somewhat unsure
[ ] 4. So-so
[ ] 5. Somewhat confident
[ ] 6. Very confident
[ ] 7. Extremely confident

Overall, how do you view the <u>revised group</u> item ranking decisions?

[ ] 1. Extremely unsure
[ ] 2. Very unsure
[ ] 3. Somewhat unsure
[ ] 4. So-so
[ ] 5. Somewhat confident
[ ] 6. Very confident
[ ] 7. Extremely confident

Overall, I regard <u>my</u> item ranking decisions as:

[ ] 1. Extremely inaccurate
[ ] 2. Very inaccurate
[ ] 3. Somewhat inaccurate
[ ] 4. So-so
[ ] 5. Somewhat accuarte
[ ] 6. Very accurate
[ ] 7. Extremely accurate

Overall, I regard the <u>revised group</u> item ranking decisions as:

[ ] 1. Extremely inaccurate
[ ] 2. Very inaccurate
[ ] 3. Somewhat inaccurate
[ ] 4. So-so
[ ] 5. Somewhat accurate
[ ] 6. Very accurate
[ ] 7. Extremely accurate

Overall, how was <u>your</u> expertise utilized in the ranking of items?

[ ] 1. Not at all
[ ] 2. Very little
[ ] 3. Fairly well
[ ] 4. Quite well
[ ] 5. Very well
[ ] 6. Excellently
[ ] 7. Perfectly

Overall, how was the expertise of <u>the board</u> utilized in the ranking of items?

[ ] 1. Not at all
[ ] 2. Very little
[ ] 3. Fairly well
[ ] 4. Quite well
[ ] 5. Very well
[ ] 6. Excellently
[ ] 7. Perfectly

Overall, how do you view <u>your</u> item ranking decisions?

[ ] 1. Extremely dissatisfied
[ ] 2. Very dissatisfied
[ ] 3. Somewhat dissatisfied
[ ] 4. Neither dissatisfied nor satisfied
[ ] 5. Somewhat satisfied
[ ] 6. Very satisfied
[ ] 7. Extremely satisfied

Overall, how do you view the <u>revised group</u> item ranking decisions?

[ ] 1. Extremely dissatisfied
[ ] 2. Very dissatisfied
[ ] 3. Somewhat dissatisfied
[ ] 4. Neither dissatisfied nor satisfied
[ ] 5. Somewhat satisfied
[ ] 6. Very satisfied
[ ] 7. Extremely satisfied

Results from the board will be made available to you upon completion of a technical report. If you wish to provide any written comments regarding the use of the Iterative Decision Method and/or the Mission Area Analysis deficiency ranking process please use the space provided below.

THANK YOU FOR YOUR COOPERATION

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